

DESCRIPTION

## FUNCTIONAL POWDERY PRODUCT

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TECHNICAL FIELD

The present invention relates to functional powdery products prepared by allowing carriers such as saccharides to support one or more vitamins such as vitamin A, vitamin B, niacin, pantothenic acid, ascorbic acid (vitamin C), vitamin E, vitamin P, and derivatives thereof; and to external dermatological agents incorporated with the functional powdery products.

BACKGROUND ART

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It has been known that vitamins such as vitamin A, vitamin B, niacin, pantothenic acid, ascorbic acid (vitamin C), vitamin E, and vitamin P have antioxidant action, capillary-recruiting action, blood-pressure-lowering action, capillary-reinforcing action, blood-pressure-lowering action, blood-cholesterol-level-improving action, anti-allergic action, action of maintaining the health of the skin and mucosa, action of maintaining acuity, action of improving metabolism, or skin-whitening action. Because of these functional properties, vitamins are focused on as food additives and have been gradually used in a variety of fields. In the field of cosmetics, there has been an increased preference to natural products with satisfactory safeness, stability, and functions; and there appears a tendency of exploring commercial products in such a manner of applying these substances or compositions containing the same to various products. While retaining

the physicochemical properties inherent to the above substances before glycosylation, such as physiological activities and ultraviolet-ray-absorbing actions (throughout the specification, it may be called "functions" as a whole, hereinafter), glycosides of glycosylated vitamins (throughout the specification, they may be called "vitamin glycosides" as a whole, hereinafter), prepared by glycosylating the above-identified vitamins and derivatives thereof (throughout the specification, they may be called "vitamins" as a whole, hereinafter), have a distinctively high water-solubility or stability and have a satisfactory safeness, compared with the above substances before glycosylation. As the form of these vitamin glycosides in use, those which are prepared by positively utilizing their high water-solubility and stability have been mainly proposed, for example, in Japanese Patent Kokai Nos. 58790/91, 7593/91, 13691/92, 156299/81, and 182413/92.

In the case of incorporating vitamin glycosides into external dermatological agents in the form of a powder, solid, or solid powder, there is found no proposal of incorporating such vitamin glycosides intact in a powder form, and as disclosed, for example, in Japanese Patent Kokai No. 137734/2003, it is employed a process for producing lipsticks, comprising mixing and emulsifying an oily component and a water phase, containing a glycosyl-hesperidin as a vitamin P glycoside, into a preparation in the form of water in oil. Thus, in the case of incorporating vitamin glycosides into external dermatological agents, aqueous solutions of vitamin glycosides are generally used. As one of the reasons that the vitamin glycosides are not used in a powder form, there is a problem of production quality that such vitamin glycosides are not only hard to be homogeneously dispersed but hard to be prepared into homogeneous products, when mixed intact with other powders before incorporated into external dermatological agents. In the case of using fat-soluble vitamins,

they might not be directly prepared into powders. To exert their inherent functions, these vitamins may cause problems of affecting the handling of the resulting cosmetics or deteriorating the makeup with the cosmetics due to water or perspiration because these vitamins may be required for use in a quite larger amount depending on the final products, compared with the case used in the form of a liquid. As an example of a solid external dermatological agent directly incorporated with a relatively small amount of a substance in a powder form, there has been proposed a product incorporated with a powder, as an ultraviolet-absorbing agent, obtained by binding a phenolic compound to a silk powder to enhance the ultraviolet-ray-absorbing effect inherent to the silk powder (cf. Japanese Patent Kokai No. 338,942/2002), however, there still remains a problem of allowing vitamin glycosides to efficiently support on carriers at an adequate concentration to exert their satisfactory functions.

Conventional cosmetics in the form of a powder, solid, or solid powder have the defect that they absorb sebum and cause skin roughness and chapping after applied to the skin. To overcome this problem, many trials have been made in such a manner of incorporating into cosmetic materials a larger amount of oils; polyols such as sugar alcohols including glycerin, xylitol, sorbitol, and polyethylene glycol; and humectants such as amino acids including pyrrolidone carboxylic acid; or emollients such as higher alcohols, higher fatty acids, ester oils, and lanolin. However, the use of any of these may cause a strong sticky feeling and distinctively deteriorate the usability and the makeup durability, resulting in no obtention of satisfactory cosmetics. To overcome these defects, for example, Japanese Patent Kokai No. 40,845/94 proposes a trehalose-containing cosmetic in a solid powder form. However, the above-identified patent literatures never disclose both the possibility of effectively incorporating vitamin glycosides on carriers such as

saccharides at a higher concentration and any external dermatological agents incorporated with powders having the above supported glycosides; and they neither disclose nor suggest that the external dermatological agents exhibit the functions of vitamins such as satisfactory  
5 ultraviolet-ray absorbability action, anti-inflammatory action, anti-allergic action, skin-whitening action, etc., for a relatively long period of time, compared with mere mixtures of such vitamin glycosides and carriers.

The present invention has a first object to provide a functional  
10 powdery product prepared by allowing carriers such as saccharides to support one or more vitamins such as vitamin A, vitamin B, niacin, pantothenic acid, ascorbic acid (vitamin C), vitamin E, vitamin P, and derivatives thereof; and has a second object to provide an external dermatological agent which contains the functional powdery product and  
15 effectively exerts the functions inherent to the above vitamins.

#### DISCLOSURE OF INVENTION

The present inventors energetically studied a method for  
20 incorporating vitamins to homogeneity into external dermatological agents in the form of a powder, solid, or solid powder. As a result, they newly found that one or more vitamin glycosides can be effectively supported on carriers such as saccharides at a higher concentration; powders supporting vitamin glycosides (hereinafter, it may be called "functional  
25 powdery products", throughout the specification) can be easily and homogeneously incorporated into external dermatological agents; and the external dermatological agents incorporated with the functional powdery products exert the functions inherent to the vitamin glycosides for a longer period of time than those which are prepared by merely incorporating

the above vitamin glycosides into carriers without supporting on the carriers. Thus, the present inventors accomplished this invention.

#### BRIEF EXPLANATION OF THE ACCOMPANYING DRAWINGS

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FIG. 1 is a figure which shows a spectral reflectance of a powdery product, prepared by allowing cellulose powder to support glycosyl-rutin, according to the present invention.

FIG. 2 is a figure which shows a spectral reflectance of a powdery  
10 product, prepared by allowing silk powder to support glycosyl-rutin, according to the present invention.

#### EXPLANATION OF SYMBOLS

- 15 1. A spectral reflectance of cellulose powder alone.
2. A spectral reflectance of a powdery product prepared by mixing cellulose powder with powdery glycosyl-rutin in an amount of 2.5% to the cellulose powder.
3. A spectral reflectance of a powdery product prepared by allowing  
20 the cellulose powder to support glycosyl-rutin in an amount of 2.5% to the cellulose powder.
4. A spectral reflectance of silk powder alone.
5. A spectral reflectance of a powdery product prepared by mixing  
25 silk powder with powdery glycosyl-rutin in an amount of 10% to the silk powder.
6. A spectral reflectance of a powdery product prepared by allowing the silk powder to support glycosyl-rutin in an amount of 10% to the silk powder.

### BEST MODE FOR CARRYING OUT THE INVENTION

The term "vitamins" as referred to as in the present invention means any vitamins to be glycosylated and derivatives thereof, for example,

5 vitamin A, vitamin B, niacin, pantothenic acid, ascorbic acid (vitamin C), vitamin E, vitamin P, and their salts and derivatives. The term "vitamin B" as referred to as in the present invention means vitamin B family such as vitamin B1, vitamin B2, vitamin B6, and salts thereof.

The term "vitamin E" as referred to as in the present invention means  
10 d- $\delta$ -tocopherol, dl- $\alpha$ -tocopherol, etc.; and the term "derivatives thereof"

means dl- $\alpha$ -tocopherol acetate, dl- $\alpha$ -tocopherol linoleate, dl- $\alpha$ -tocopherol nicotinate, and dl- $\alpha$ -tocopherol succinate, as well as chromanol compounds as disclosed in, for example, Japanese Patent Kokai No. 118,287/95. The term "vitamin P or derivatives thereof" as referred  
15 to as in the present invention means substances which have the structure of quercetin, hesperetin, naringenin, or esculetin; and also means any substances as long as they retain the functions of the above substances and they can be glycosylated, such as rutin, hesperidin, naringin, esculetin, esculin, etc.

20 The vitamin glycosides used in the present invention mean those which are composed of the above-identified vitamins bound with one or more glycosyl residues, and which can directly or after decomposed by enzymes, etc., exert the functions of vitamins, independently of the type, binding site, or binding fashion of glycosyl residue. Independently of  
25 their origins and preparation methods, any vitamin glycosides can be used; and those which are prepared by fermentation method, enzymatic method, organic synthetic method, etc., and those which are commercially available vitamin glycosides or compositions containing the same can be arbitrarily

used. These vitamin glycosides or compositions containing the same can be prepared by subjecting solutions of vitamins or compositions containing the same and adequate saccharides as substrates used for the following enzymes having saccharide-transferring activity to the action of an enzyme such as cyclomaltodextrin glucanotransferase (E.C. 2.4.19, may be abbreviated as "CGTase", hereinafter),  $\alpha$ -glucosidase,  $\alpha$ -amylase,  $\beta$ -galactosidase,  $\alpha$ -galactosidase, lysozyme, or lipase to form glycosides having transferred glycosyl residues such as  $\alpha$ -D-glucopyranosyl,  $\beta$ -galactopyranosyl, or  $\beta$ -D-chitosaminyl residue. The resulting reaction solutions obtained by these methods can be arbitrarily used intact as solutions containing vitamin glycosides or used after partially or highly purified, crystallized, and optionally further dried and pulverized. Concrete examples of such are as follows: By employing enzymatic methods as disclosed in Japanese Patent Kokai Nos. 58,790/91, 7,593/91, 13,691/92, 156,299/81, and 139,288/91 applied for by the same applicant as the present invention, solutions which contain rutin, hesperidin, naringin, esculin, ascorbic acid, or a composition containing any of them and further contain partial starch hydrolyzates such as starch or dextrin are allowed to the action of an enzyme with saccharide-transferring activity such as CGTase to bound one or more glucose residues to the above substances in order to form saccharide-transferred products such as  $\alpha$ -glycosyl-rutin,  $\alpha$ -glycosyl-hesperidin,  $\alpha$ -glycosyl-naringin,  $\alpha$ -glycosyl-esculin,  $\alpha$ -glycosyl-L-ascorbic acid, etc. These preparation methods can be advantageously used on an industrial scale because they can produce the desired substances with only a relatively simple production facility efficiently at a lower cost by using abundant, lower-cost starch and partial hydrolyzates thereof as materials.

The term "functional powdery products" as referred to as in the

present invention means powders of saccharides as carriers on which one or more of the above-identified vitamin glycosides and derivatives thereof are supported, and means those which have the functions of anti-inflammatory action, anti-allergic action, capillary-reinforcing action, blood-flow-improving action, or skin-whitening action inherent to the above-identified vitamins. Among which, the functional powdery products, having glycosides of vitamin P or ascorbic acid supported on carries, are particularly desirable because such glycosides have a relatively high water-solubility and can be supported on carriers such as saccharides efficiently at a relatively high concentration and also exert their functions efficiently for a relatively long period of time, compared with those which are prepared by merely incorporating these vitamin glycosides into carriers without supporting on the carriers. Glycosides of rutin, hesperidin, naringin, esculin, and esculetin are preferable as the vitamin P glycosides, and glucosides thereof are most preferable because of their safeness and easiness of their preparation methods. As the glycosides of ascorbic acid, ascorbic acid 2-glycoside is preferable, while ascorbic acid 2-glucoside is most preferable.

The preparation method for the functional powdery products of the present invention should not particularly be restricted to specific ones and includes conventional ones as long as they can support vitamin glycosides on carries such as saccharides. For example, the functional powdery products can be prepared by keeping carries such as saccharides in a suspended condition in solvents such as water and alcohols; dissolving one or more vitamin glycosides in the solvents, stirring the mixtures at a desired temperature for a prescribed period of time to make adsorption reaction; separating and drying the resulting functional powdery products from the solvents by appropriate methods such as centrifugal separation, filtration, and sedimentation; and optionally washing the separated



functional powdery products with solvents and then drying the resultants. Depending on use, the functional powdery products thus obtained can be arbitrarily used intact without further separation and drying steps in formulations for external dermatological agents or the process for  
5 producing external dermatological agents.

The functional powdery products of the present invention can be prepared by supporting vitamin glycosides on carriers in combination with one or more colorants such as cyanine, squalillium, pyrylium, styryl, merocyanine, rhodacyanine, oxonol, coumarin, quinacridone,  
10 anthraquinone, polyazo, benzimidazolone, polyazo, benzimidazolone, azo, anthraquinone, anthocyanin, chalcone, and carotenoid colorants, as well as other natural- or synthetic-colorants. Similarly as in glycosides of quercetin and/or hesperetin as colored vitamin glycosides, they can be advantageously used to modify the color tint of the above colorants  
15 when used in combination therewith. The modification of the color tint of the above colorants can be effectively exerted when the above colorants or those in a powder form, where the colorants are supported on carries, are mixed with the colored vitamin glycosides.

Examples of the natural colorants used in the present invention  
20 include safflower dye, gardenia yellow, glory bush dye, cochineal dye, turmeric dye, monascuscolor, beet dye, lac dye, madder color, perilla color, red cabbage color, red radish color, purple sweet potato color, elderberry color, blueberry color, red pepper color, annatto, spirulina color, cacao color, tamarind color, Japanese persimmon color, Koaliang  
25 color, caramel color, etc. The carriers used to prepare the powders, where the above-identified colorants are supported on the carriers, should not specifically be restricted; any of those which are used in the later-described preparation of the functional powdery products of the present invention can be arbitrarily used.

The amount of vitamin glycosides to be supported on carriers can be quantified by conventional determination methods depending on the vitamin glycosides, respectively. In the case that the amount is insufficient when judged from the data on determination, it can be controlled by repeatedly subjecting the vitamin glycosides to adsorption treatment for supporting on the carriers. Measurement of chromatic valence ( $E^{1\%}$ ) enables to determine the amount of quercetin glycosides, hesperetin glycosides, and/or naringenin glycosides. The amount of ascorbic acid glycosides to be supported on carriers can be quantified by extracting the ascorbic acid glycosides from the carriers and subjecting the extract to high-performance liquid chromatography (HPLC) for quantitation. Accordingly, the carriers preferably used in the present invention are those which are insoluble or substantially insoluble in solvents. In the case that the adsorption ability of vitamin glycosides on carriers is low, they can be arbitrarily supported on the carriers in conventional manner by mordanting method using appropriate metal compounds. The term "chromatic valence ( $E^{1\%}$ )" as referred to as in the present invention means the absorbance at the maximum absorption wavelength for each substance in a suspension with a concentration of one percent by weight (throughout the specification, "% by weight" may be abbreviated as "%" hereinafter, unless specified otherwise) of quercetin glycoside, hesperetin glycoside, or naringenin glycoside.

The carriers preferably used in preparing the functional powdery products of the present invention should not specifically be restricted as long as they can support vitamin glycosides. Examples of such are listed as follows: Powders of saccharides such as acetyl cellulose, cellulose, starch, modified starch, agarose, agar, alginic acid, chitosan, chitin, agarose, and agar; powders of proteins such as silk, fibroin, collagen, gelatin, and casein; powders of derivatives of these saccharides

and proteins; inorganic powders of hydroxyapatite, silica, and kaolin; and powders of synthetic high molecular polymers such as nylon, polyethylene, benzoguanamine, tetrafluoroethylene, di-styrene-benzene-pinhole-polymer, and polyamide high molecule (throughout the specification, "the powders used as carriers for the functional powdery products" may be called "powders", hereinafter). Among which, the powders of saccharides and proteins are preferable because of their origin as natural materials; the powders of saccharides are more preferable because of their stability against acids, alkalis, and heat; and the powders of cellulose are most preferable because of their adsorption efficiency. The form of the above-identified carriers should not specifically be restricted and any forms of spheres, porous spheres, plates, and fibers can be used. The carriers in a sphere form are desirable for obtaining the desired functions and effects by using adsorption materials in a possible lowest amount.

The average particle size of the functional powdery products of the present invention should not specifically be restricted as long as it is within the range of those for powdery products usually used in external dermatological agents. Considering the usability of external dermatological agents incorporated with the functional powdery products, those with an average particle size of about 0.01 to about 30  $\mu\text{m}$ , preferably, about 0.1 to about 20  $\mu\text{m}$ , and more preferably, about 2 to about 10  $\mu\text{m}$ , are particularly desirable.

The term "supported/supporting" as referred to as in the present invention means that vitamin glycosides are bound to the surface of carriers such as saccharides (in the case that the saccharides are porous, the internal parts thereof are included in the surface) via a relatively weak power such as mainly hydrophilic or ionic bonding, an adhesion or chemical bonding, or a combination thereof.

From the functions and effects and the usability of the external dermatological agents, the total amount of vitamin glycosides supported on carriers is preferably within the range of 0.01 to 30% to the total amount of the functional powdery products, preferably, 0.1 to 20%, and particularly, 1 to 15%. In the case of the amount of less than 0.01%, the desired result could not be attained; while in the case of the amount of over 30%, the work efficiency in a supporting step may be lowered or it may problematically deteriorate the usability due to the formulation of external dermatological agents incorporated with the functional powdery products.

The functional powdery products thus obtained, where vitamin glycosides are homogeneously supported on the surface of carriers, have an improved solvent resistance, particularly, water resistance, heat tolerance, light absorbency, etc., by a large margin; and these effects become particularly distinct when saccharides are used as carriers. It is estimable that both the carriers and the vitamin glycosides supported on the carriers would have a common similar part in their structures. Since the carriers such as saccharides have a satisfactory humectancy, the functional powdery products prepared with such saccharides can be advantageously used as humectants for external dermatological agents. The functional powdery products containing supported vitamin glycosides such as quercetin glycosides, hesperetin glycosides, naringenin glycosides, and/or ascorbic acid glycosides, which absorb light in the ultraviolet ray region, can be advantageously used as ultraviolet-ray-absorbing agents. While the functional powdery products supporting vitamin glycosides such as quercetin glycosides and hesperetin glycosides, which absorb both lights in the ultraviolet-ray- and the visible-regions, can be arbitrarily used to modify the color tint of external dermatological agents when used in combination with other

colorants such as pigments and dyes.

The functional powdery products of the present invention can be incorporated into external dermatological agents intact or optionally in the form of an additive for external dermatological agents incorporated with one or more pharmaceutically acceptable ingredients as external dermatological agents. Examples of such pharmaceutically acceptable ingredients include any of the later described substances without specific restriction; reducing saccharides, non-reducing saccharides, sugar alcohols, water-soluble polysaccharides, synthetic high molecular polymers, and substances having anti-oxidation action or emulsifying action. Among which,  $\alpha,\alpha$ -trehalose and saccharide derivatives thereof such as  $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose,  $\alpha$ -maltosyl  $\alpha,\alpha$ -trehalose, and  $\alpha$ -maltotriosyl  $\alpha,\alpha$ -trehalose (disclosed in Japanese Patent Kokai No. 143,876/95 and Japanese Patent No. 3,182,679 applied for by the same applicant as the present invention), as well as saccharides containing the above saccharide derivatives (they all may be called "saccharide derivatives of  $\alpha,\alpha$ -trehalose", hereinafter) are particularly desirable because of their strong inhibitory action on the deterioration of vitamin glycosides, solidification inhibitory action on powders, and strong moisture-absorption inhibitory action. The additives for external dermatological agents thus obtained have a feature that they more effectively inhibit the functional reduction and solidification of the functional powdery products of the present invention during storage or transportation.

The amount of the functional powdery products of the present invention or the additives for external dermatological agents containing the same should not specifically be restricted as long as it can sufficiently exert the functions of vitamin glycosides and derivatives thereof.

Considering the level of exerted functions and the usability of the functional powdery products or the additives for external dermatological agents containing the same, it is usually set to an amount of 0.01 to 20%, preferably, 0.1 to 10%, more preferably, 0.5 to 10% in terms of the functional powdery products in total against the total amount of each external dermatological agent.

To prepare the external dermatological agents of the present invention, the functional powdery products of the present invention or the additives for external dermatological agents containing the same can be incorporated into the desired external dermatological agents at any step from the stage of handling the starting materials to the stage of obtaining the final products. Concrete examples of such are, for example, conventional techniques such as mixing, kneading, dissolving, melting, dispersing, suspending, emulsifying, reverse micelle technique, penetrating, crystallizing, spreading, applying, spraying, injecting, soaking, and solidifying, which are appropriately selected. These techniques can be arbitrarily used alone or in an appropriate combination of two or more of them.

The term "pharmaceutically acceptable ingredients as external dermatological agents" as referred to as in the present invention should not specifically be restricted as long as they do not affect the functions of the functional powdery products of the present invention, and it includes substances having circulation-promotion action, anti-inflammatory action, antibacterial action, moisture-retaining action, skin-whitening action, ultraviolet-ray-absorbing action, ultraviolet-ray-scattering action, emulsifying action, astringency, anti-wrinkle action, cell-activating action, or percutaneous-absorption-promoting action; and/or oils and fats. One or more of these ingredients can be incorporated into the external dermatological agents of the present invention or the

additives for external dermatological agents, and a plurality of such ingredients having a similar function and effect are arbitrarily incorporated in combination. The amount of these ingredients to be incorporated should not specifically be restricted as long as it does not affect the functions of the functional powdery products of the present invention, while exerting the desired functions of these ingredients. Usually, these ingredients are incorporated in an approximate amount used in conventional external dermatological agents.

The term "powder other than the functional powdery product" as referred to as in the present invention include non-organic powder such as talc, kaolin, sericite, white mica, synthetic mica, red mica, black mica, lithia mica, vermiculite, magnesium carbonate, calcium carbonate, diatomite, magnesium silicate, calcium silicate, aluminum silicate, barium silicate, strontium silicate, metal salts of tungstate,  $\alpha$ -iron oxide, iron oxide hydrate, silica and hydroxyapatite;  $\alpha,\alpha$ -trehalose;  $\alpha,\beta$ -trehalose; saccharide derivatives of  $\alpha,\alpha$ -trehalose such as  $\alpha$ -maltosyl  $\alpha,\alpha$ -trehalose and  $\alpha$ -maltotriosyl  $\alpha,\alpha$ -trehalose; monosaccharides; disaccharides; oligosaccharides; dextrans; sugar alcohols; polymer powders such as nylon powder, polyethylene powder, benzoguanamine powder, tetrafluoroethylene powder, distyrene-benzene-pinhole polymer powder and polyamide polymer powder; agar powder; agarose powder; alginate powder; starch powder; processed starch; microcrystalline cellulose powder; chitin powder; chitosan powder; organic powders containing proteins such as silk, casein and gelatin; powders such as shikon (*Lithospermum* root) black powder, gardenia yellow powder, safflower red powder, red beat powder and *ouni* (deep yellow) powder (shikon black dyed powder supporting shikon dye can be referred to Japanese Patent Publication Nos. 73,278/92 or 220,267/91) supporting

dyes such as shikonin derivatives including shikonin dye, gardenia dye, safflower dye, red beat dye and cochineal dye to the above organic powders; inorganic white pigments such as titanium oxide and zinc oxide; inorganic red pigments such as iron oxide(colcothar) and iron titanate; inorganic  
5 yellow pigments such as yellow oxide of iron and yellow ocher; inorganic violet pigments such as mango violet and cobalt violet; inorganic green pigments such as chromium oxide, chromium hydride and cobalt titanate; inorganic blue pigments such as ultramarine blue and Prussian blue; pearl pigments such as titanium oxide-coated mica, titamiun oxide-coated  
10 bismuth oxychloride, bismuth oxychloride, titanium oxide-coated talc, fish scale guanine, colored titanium oxide-coated mica; and metal powder pigments such as aluminum powder and copper powder; and powdered hydrophobes thereof. These materials can be freely used for the external skin preparation as long as they do not inhibit the functions of the  
15 functional powdery product of the present invention. They are incorporated in the preparation in an amount in the range of usually 0.0003-95%, preferably 0.01-80%, more preferably 0.01-75% by weight.

Examples of substances having blood flow-promoting effect incorporated into the external dermatological agent of the present  
20 invention are sialid, ginseng, ginkgo, ginger, garlic, angelica, arnica, fennel, plectranthi herba, *Nasturtium officinale*, chamomile, Roman chamomile, carrot, gentian, burdock, rice, crataegi fructus, "*shiitake*", *Crataegus oxyacantha*, juniper, *Cnidium rhizome*, thyme, clove, citrus unshiu peel, Japanese angelica root, persicae semen, *Paulownia bark*,  
25 butche's broom, grape, peony, horse chestnut, balm mint, *Citrus junos*, loquat, coix seed, rosemary, rose hips, citrus unshiu peel, Japanese angelica, peach, apricot, walnut, horsetail, calamus root, aloe, *Plectranthi herba*, gentian, capsicum and *Citrus junos*; hesperidin; glycosyl-hesperidin; rutin; glycosyl-rutin; acetylcholine; carpronium



chloride; diphenhydramine hydrochloride;  $\gamma$ -oryzanol; l-menthol; cepharanthine; vitamin E or vitamin E derivatives including d- $\delta$ -tocopherol, dl- $\alpha$ -tocopherol, dl- $\alpha$ -tocopherol acetate, dl- $\alpha$ -tocopherol linoleate, dl- $\alpha$ -tocopherol nicotinate, 5 dl- $\alpha$ -tocopherol succinate and vitamin E nicotinate; minoxidil; nicotinic acid amide; vanillylamide nonylate; carpronium chloride, or carbon dioxide. The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product of the present invention. It is usually 0.001-5%, 10 preferably 0.01-2% to the total amount of the external dermatological agent. In the case of less than 0.001%, they are not expected to exert the desired effect. In the case of more than 5%, they are not dose-dependently effective. When used in a hair tonic containing these substances as effective ingredients, the amount of the substances is 15 not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product of the present invention. It is usually 0.001-5%, preferably 0.02-3%. The term "plant or plant ingredient" as referred to as in the present invention means crushed materials from plant bodies such as leaves, stems, roots, flowers, fruits 20 and bark; and extracts such as essence, essential oils, oils, fats and tinctures, obtained by treating with a solvent from plant materials. The resulting materials are optionally purified roughly or completely. The term "substance having blood flow-promoting effect" as referred to as in the present invention includes substances having the effect 25 on expanding the blood vessels to promote blood circulation. In addition, it also includes substances having the effect on inducing a factor having blood flow-promoting effect with a local administration. Examples of such substances are capsoci tincture, zingiberis tincture, kantiris

tincture and wanyl norylate.

Examples of substances having antiinflammatory effect are  
allantoin or derivatives thereof such as allantoin acetyl-dl-methionine,  
allantoin chlorhydroxy aluminum, allantoin dihydroxy aluminum and  
5 allantoin polygaracturonate; glycyrrhetin or derivatives thereof such  
as glycyrrhetinic acid, glycyrrhizinic acid, allantoin glycyrrhetinate,  
glycerin glycyrrhetinate, stearyl glycyrrhetinate, glycyrrhetinyl  
stearate, disodium 3-succinyloxyglycyrrhetinate, dipotassium  
glycyrrhizinate and monoammonium glycyrrhetinate; pantothenic acid or  
10 derivatives thereof such as pantothenyl alcohols, pantothenyl  
ethylethers, acetyl pantothenyl ethylethers, benzoil pantothenyl  
ethylethers, calcium pantothenate, sodium pantothenate, acetyl  
pantothenyl ethylethers, pantothenyl ethylether benzoate, and  
pantethine; vitamin E or derivatives thereof such as d- $\delta$ -tocopherol,  
15 dl- $\alpha$ -tocopherol, dl- $\alpha$ -tocopherol acetate, dl- $\alpha$ -tocopherol linoleate,  
dl- $\alpha$ -tocopherol nicotinate, and dl- $\alpha$ -tocopherol succinate; L-ascorbic  
acid or derivatives thereof such as L-ascorbic acid glycoside including  
L-ascorbic acid 2-glucoside, acyl derivatives of L-ascorbic acid  
glycoside, ascorbyl tetrahexyldeconate, ascorbic acid tocopherol  
20 phosphate diesters (binding L-ascorbic acid to tocopherol via phosphoryl  
group), L-ascorbic acid sulfate esters, ascorbyl dipalmitate, ascorbyl  
palmitate, stearyl L-ascorbate, L-ascorbyl phosphate, ethyl L-ascorbate,  
acyl derivatives thereof; alkali metal or alkaline earth metal salts  
thereof; pyridoxine hydrochloride; menthol; biotin; camphor;  
25 turpentine; zinc oxide; azulene; quai azulene and derivatives thereof;  
mefenamic acid or derivatives thereof; phenylbutazone or derivatives  
thereof; indomethacin or derivatives thereof; ibuprofen or derivatives  
thereof; ketoprofen or derivatives thereof;  $\epsilon$ -aminocaproic acid; sodium

diclofenac; diphenhydramine; tranexamic acid or derivatives thereof;  
dexamethasone; cortisone or esters thereof; hydrocortisone or esters  
thereof; adrenal cortical hormone such as prednisone and prednisolone;  
antihistamic agent; esculin; esculetin or derivatives thereof; rose  
5 fruit; *Bistorta Major*; turmeric; *Hypericum erectum*; phellodendron bark;  
glycyrrhiza; *Lonicera japonica*; watercress; comfrey; acanthopanax  
bark; sage; lithospermum root; white birch; tian cha; tea leaf; *Calendula*  
*officinatis*; elderberry; *Typha angustifolia*; *Sapindus mukurossi*,  
eucalyptus extract, broccoli, Japanese angelica root, loquat, chamomile,  
10 wormwood, aloe, ginseng, indigo, phellodendron bark powder, *Myrica rubra*  
bark, gambir, sweet hydrangea leaf, *Althea officinalis* root, arnica,  
echinacea, *Plectranthi herba*, *scutellaria* root, barley, St. John's wort,  
orange, Japanese valerian, Roman chamomile, *Artemisia capillaris*,  
cucumber, gardenia, *Sasa albo-marginate*, gentian, geranium herb, burdock,  
15 *Xanthoxylum piperitum*, labiate, linden, peony root, ivy, juniper,  
peppermint, *Cnidium rhizome*, sialid, sage, mori cortex, jujube, thyme,  
*Benincasae semen*, *Calendula officinalis*, persicae semen, houttuynia,  
cordata, *Potantilla tormentilla*, parsley, mint, nettle, sandalwood,  
Butcher's bloom, grape, safflower, peony, linden, horse chestnut, peach,  
20 cornflower, wormwood, lavender, rosemary, rose hips, carrot and Japanese  
angelica root. It also includes  $\alpha,\alpha$ -trehalose, cyclic tetrasaccharide  
and/or saccharide derivatives thereof (hereinafter, it is simply called  
"cyclic tetrasaccharide".), which is disclosed by the same applicant  
in International Patent Publication Nos. WO 02/24832, WO 02/10361 and  
25 WO 02/072594, and Japanese Patent Kokai No. 30496/2003, and saccharide  
derivatives of  $\alpha,\alpha$ -trehalose. The amount of the substances is not  
specifically restricted as long as the substances do not inhibit the  
functions of the functional powdery product of the present invention.

The amount of the substance is not restricted as long as it exhibits antiinflammatory effect against dermatitis alone or in combination with other substances. It is usually 0.001-5%, preferably 0.01-3% to the total amount of the external dermatological agent. In the case of less than 0.001%, they are not expected to exert the desired effect. In the case of more than 5%, they are not dose-dependently effective. When the ingredients are known to be in plant tissues such as glycyrrhizin in glycyrriza, they can be used in the present invention as long as they are properly prepared as extracts of plants containing thereof.

"Substances having anti-bacterial effect" is not specifically restricted and can be selected from substances having antibacterial effect acceptable to external dermatological agents. Examples of such substances are lower alcohols such as ethanol; benzoic acid or its salts or esters; alkylldiaminoglycine hydrochloride; photosensitizing dye such as pionin (*KANKO-SO* No.201); chlorcresol; chlorbutanol; salicylic acid or salts thereof; sorbinic acid or salts or esters thereof; dehydroacetate or salts thereof; trichlorohydroxy phenyl ether; paraoxybenzoic ester; sodium paraoxybenzoate; phenoxyethanol; phenol; sodium lauryl aminoethyl glycine; resorcin; zinc-ammonia-silver substitutional zeolite; pantothenyl ethyl ethyl benzoate; isopropyl methyl phenol; cetylpyridium chloride; benzalkonium chloride; benzethonium chloride; chlorhexidine hydrochloride; orthophenylphenol; sodium orthophenyl phenoxide; chlorhexidine gluconate, cresol, chloramine-T, chlorxylenol, chlorphenesin, chlorhexidine, 1,3-dimethylol-5,5-dimethylhydantoin, alkylisoquinolinium bromide, thianthol, thymol, trichloro carbanilide, parachlorphenol, halocarban, hinokithiol, zinc pyrithione, methyl chloro isothiazolinon/methylisothiazolin solution, N,N''-methylenebis [N'-(hydroxymethyl-2,5-dioxy-4-imidazoliny)urea], 2-(p-dimethylaminostyryl)-3-heptyl-4-methyl-thiazolinium iodide,

imidazolidinyl urea, dimethylol dimethyl hydantoin, glutaraldehyde, jamal II, bisabolol, chlorhexidine gluconate, isopropyl methyl phenol, phenoxy ethanol, or plants or their components having an antibacterial effect such as tea oil, propolis, *Sapindus mukurossi*, asparagus, aloe, 5 gingko, turmeric, echinacea, *Plectranthi herba*, *Scutellaria radix*, *Coptis rhizome*, *Hypericum erectum*, clusiaceous, orange, *Artemisia capillaris*, gardenia, *Sasa albo-marginate*, *Sophora angustifolia*, grapefruit, *Geranium thunbergii*, *Xanthoxylum piperitum*, lithospermum root, labiate, white birch, *Lonicera japonica*, *Achillea millefolium*, 10 peppermint, *Cnidium rhizome*, sage, mori cortex, thyme, clove, *Calendula officinalis*, peony, hop, mint, peach, eucalyptus, lavender, rose hips, rosemary, wormwood, peony root, calamus and *Saponaria officinalis*. The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product 15 of the present invention and exert the antibacterial effect alone or in combination with other substances. It is usually 0.0001-3% to the total amount of the external dermatological agent. In the case of less than 0.001%, they are not expected to exert the desired effect. In the case of more than 2%, they are not dose-dependently effective.

20           Examples of substances having moisturizing effect are mucopolysaccharides such as hyaluronic acid, chondroitin sulfate, delmatan sulfate, heparan sulfate and heparin, or derivatives or salts thereof; ceramide; peptides or proteins such as collagen, elastin, fibronectin, keratin, gelatin and casein, or derivatives or hydrozate 25 thereof; amino acids such as glycine, alanine, valine, serine, threonine, methionine, phenylalanine, leucine, tyrosine, proline, isoleucine, tryptphan, hydroxyproline, theanine, ornithine, citrulline, asparagine, aspartic acid, glutamine, glutamic acid, arginine, histidine, lysine,

hydroxylysine, cysteine, cystine, acylglutamate and  $\gamma$ -polyglutamic acid,  
 or derivatives thereof; pyrrolidone carbonate; pearl essence; reducing  
 or nonreducing saccharides such as powder starch hydrolyzates, xylose,  
 glucose, fructose, maltose, sucrose, lactose, palatinose, isomerized  
 5 sugar, honey, maple sugar, brown sugar, glycosyl-sucrose-containing  
 syrup, maltooligosaccharide, dextrin, isomaltooligosaccharide,  
 galactooligosaccharide, fructooligosaccharide, nigerooligosaccharide,  
 galactosyl-glucoside, lactosucrose,  $\alpha,\alpha$ -trehalose,  $\alpha,\beta$ -trehalose  
 (neotrehalose),  $\beta,\beta$ -trehalose (isotrehalose), cyclic tetrasaccharide,  
 10 saccharide derivatives of  $\alpha,\alpha$ -trehalose and starch; sugar alcohols such  
 as erythritol, pentaerythritol, sorbitol, xylitol, maltitol,  
 isomaltitol, lactitol, panitol, maltotriitol, maltotetraitol and  
 maltopentaitol; gums such as pullulan, levan, sodium arginate, agar,  
 gum Arabic, guar gum, tragacanth gum, xanthane gum, carrageenan and  
 15 locust bean gum; water-soluble polymers such as pectin, methyl cellulose,  
 carboxy methyl cellulose, polyvinyl alcohol, polyvinyl pyrrolidone,  
 polydextrose and polyacrylic acid; polyols such as sugar esters, dextrin  
 derivatives, glycerin, 1,3-butylene glycol, 1,4-butylene glycol,  
 dipropylene glycol, polyethylene glycol, propylene glycol and amylene  
 20 glycol; seaweeds such as coralline; plants or extracts thereof having  
 moisturizing effect such as aloe, hamamelis, *Xanthoxylum piperitum*,  
*Artemisia vulgaris*, kava-kava, Asian ginseng, aloe, nettle, fennel,  
 witch hazel, turmeric, *Lotus corniculatus*, *Phellodendron amurense*,  
*Hypericum erectum*, rice, chamolile, *Artemisa capillaris*, kiwi, cucumber,  
 25 *Sophora angustifolia*, grape, gardenia, comfrey, *Saponaria officinalis*,  
 rehmannia root, labiate, peony root, white birch, horsetail, linden,  
 sage, sialid, *Cnidium rhizome*, mulberry, soybean, thyme, Japanese  
 angelica root, *Calendula officinalis*, parsley, coix seed, Butcher's

bloom, loofah, hop, horse chestnut, balmint, peach, saxifrage, bramble, lavender, *Astragalus sinicus*, rose, *Rose multiflora*, rosemary, glycyrrhiza, tea leaf (green tea, black tea, oolong tea), lily, barley, wheat, apricot, oat, lithospermum root, lemon, quince, orange, strawberry, safflower, gentian, mint, spearmint, peppermint, *Sapindus mukurossi*, eucalyptus, *Lamium album*, pine, cornflower, *Sanguisorba officinalis*, avocado, seaweed, grapefruit, prune, lime, *Citrus iunos*, *Coptis rhizome*, cypress, peony, olive, sunflower, jojoba, macadamia nut, *Limnanthes alba*, camellia, almond, cacao and sesame. The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product and exert the moisturizing effect alone or in combination with other substances. It is usually 0.1 or more, preferably 0.5% to total amount of the external dermatological agent. Upper limit of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product and can be used in a desired amount depending on the purpose of the objective external dermatological agent. The upper limit is usually 40% or less, preferably 20% or less to total amount of the external dermatological agent.

Saccharide mixtures containing saccharide derivatives of  $\alpha,\alpha$ -trehalose such as  $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose,  $\alpha$ -maltosyl  $\alpha,\alpha$ -trehalose and  $\alpha$ -maltotriosyl  $\alpha,\alpha$ -trehalose or containing saccharides hydrogenated from reducing saccharides coexisting during processing steps are preferably used as materials having a moisture retaining property for the external dermatological agent of the present invention because they can stabilize the functional powdery product of the present invention and improve skin feeling lowered possibly depending amount of functional powdery product or shape of the external dermatological agent as well

as protect skins from external stress such as ultraviolet, suppress sticky feeling when the external dermatological agent is used, and have an effect on smoothening skins and hairs as a feel improving agent. Saccharide mixture containing about 50% or more of  $\alpha$ -maltosyl  $\alpha,\alpha$ -trehalose, 5-25% of other saccharide derivatives of  $\alpha,\alpha$ -trehalose, 25-45% of sugar alcohols of maltooligosaccharides including sorbitol, maltitol, maltotriitol, mantotetraitol and maltopentaitol is more preferably used because it has the effect on enhancing the functions of the functional powdery product of the present invention as well as satisfactory effects on moisture retaining, suppression of sticky feeling for external dermatological agents, anti-inflammation, protection or activation of cells, and keeping quality. A crystalline form of  $\alpha$ -maltosyl  $\alpha,\alpha$ -trehalose is advantageously used for external dermatological agents in the form of powder, solid or solid powder because it further has satisfactory effect on absorbing lipids and is an easily handling powder.

Examples of substances having whitening effect are L-ascorbic acid derivatives and/or alkali metal or alkaline earth metal salts thereof such as L-ascorbic acid, L-ascorbic acid glycosides including L-ascorbic acid 2-glucoside, acyl-derivatives of L-ascorbic acid 2-glycoside, ascorbyl tetrahexyldeconate, ascorbic acid tocopherol phosphate diester (binding L-ascorbic acid to tocopherol via phosphoryl group), L-ascorbic acid sulfate ester, ascorbyl dipalmitate, ascorbyl palmitate, stearyl L-ascorbate, L-ascorbyl phosphate, ethyl L-ascorbate, acylated derivatives thereof; lactic acid, kojic acid, ellagic acid or derivatives thereof and/or alkali metal salts or alkaline earth metal salts, tranexamic acid, phytic acid, glutathione, hydroquinone or derivatives thereof including arbutin, plants or ingredients thereof having



whitening effect such as chamomilla ET, "RUCINOL®" (4-n-Butylresorcinol),  
chamomile extract, brown sugar extract, albutin (a kind of glycosyl  
hydroquinone), glycyrrhiza, mori cortex, uva-ursi, bilberry extract,  
houlttuynia herb extract, deer horn shape ganoderma lucidum extract,  
5 iris, clove, turmeric, capsicum, karela, aloe, tea leaf, glycyrrhiza,  
scutellaria root, chamomile, mori cortex, pueraria root, *Xanthoxylum*  
*piperitum*, moutan bark, ginkgo, rose fruit, *Coptis rhizome*, *Hypericum*  
*erectum*, gardenia, *Sophorae radix*, rice, rice bran, asiasarum root,  
peony root, cnidium root, mori cortex, tea leaf, Japanese angelica root,  
10 *Calendula officinalis*, hamamelis, safflower, *Amethyst sage*, gambir,  
hackberry, *Diospyros kaki*, sage, Japanese radish, azalea, parsley, hop  
and coix seed; animal ingredients such as placenta extract; and inorganic  
substance such as sulfur. The amount of the substances is not  
specifically restricted as long as the substances do not inhibit the  
15 functions of the functional powdery product and exert the antioxidant  
effect alone or in combination with other substances. It is usually  
0.001-5%, preferably 0.01-3% to the total amount of the external  
dermatological agent. In the case of less than 0.001%, they are not  
expected to exert the desired effect. In the case of more than 5%, they  
20 are not dose-dependently effective.

Examples of substances having antioxidant effect are plants  
or plants ingredients having antioxidant effect such as vitamin A or  
derivatives thereof, vitamin B or derivatives thereof, L-ascorbic acid  
or derivatives thereof, vitamin D or derivatives thereof, vitamin E  
25 or derivatives thereof, dibutyl hydroxy toluene, butyl hydroxy anisole,  
superoxide dismutase, mannitol, carotenoids, astaxanthin, rutin or  
derivatives thereof, rutin, hesperidin, quercetin, catechin,  
epicatechin, epigallocatechin, or derivatives thereof including  
saccharide derivatives, gallic acid or derivatives thereof, glutathione

or derivatives thereof, glutathione,  $\beta$ -carotenes or derivatives thereof, ubiquinol, flavonoids, proanthocyanidin, polyphenols including grape seed polyphenol, sweet hydrangea leaf, turmeric, rose fruit, echinacea, *Scutellaria* root, *Hypericum erectum*, Chinese gall nut, *Geranium*  
5 *thunbergii*, rice, rice bran, comfrey, *Xanthoxylum piperitum*, labiate, peony root, soybean, "natto" (soybeans fermented in their own bacteria), tea leaf, clove, loquat, peony, horse chestnut, saxifrage, rooibos, rosemary, spirulina, chlorella and dunaliella. In addition, they include bilirubin, cholesterol, tryptophan, histidine, thiotaurine and  
10 hypotaurine. The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product and exert the antioxidant effect alone or in combination with other substances. It is usually 0.0001-5%, preferably 0.001-2% to total amount of the external dermatological agent. In the case of  
15 less than 0.0001%, they are not expected to exert the desired effect. In the case of more than 5%, they are not dose-dependently effective.

Examples of substances having UV-absorbing effect are benzoate compounds such as paraaminobenzoic acid (PABA), PABA monoglycerin ester, N,N-dipropoxy PABA ethyl ester, N,N-diethoxy PABA ethyl ester,  
20 N,N-dimethyl PABA ethyl ester, N,N-dimethyl PABA butyl ester; anthranilate compounds such as homomenthyl-N-acetylanthranilate; salicylate compounds such as amylsalicylate, menthylsalicylate, homomenthylsalicylate, octylsalicylate, phenylsalicylate, benzylsalicylate, p-isopropanol phenylsalicylate; cinnamate compounds  
25 such as octylcinnamate, ethyl-4-isopropylcinnamate, methy-2,5-diisopropylcinnamate, ethy-2,4-diisopropylcinnamate, methy-2,4-diisopropylcinnamate, propyl-p-methoxycinnamate, isopropyl-p-methoxycinnamate, isoamyl-p-methoxycinnamate, octyl-p-methoxycinnamate (2-ethylhexyl-p-methoxycinnamate), 2-ethoxyethy-

p-methoxycinnamate, cyclohexyl-p-methoxycinnamate, ethyl- $\alpha$ -cyano- $\beta$ -phenylcinnamate, 2-ethylhexyl- $\alpha$ -cyano- $\beta$ -phenylcinnamate and glyceryl mono-2-ethylhexanoyl- diparamethoxycinnamate; benzophenone compound such as 2,4-dihydroxy benzophenone, 2,2'-dihydroxy-4-methoxy  
5 bebzophenone, 2,2'-dihydroxy-4,4'-dimethoxy benzophenone, 2,2',4,4'-tetrahydroxy benzophenone, 2-hydroxy-4-methoxy benzophenone, 2-hydroxy-4-methoxy-4'-methyl benzophenone, 2-hydroxy-4-methoxy benzophenone-5-sulfonate, 4-phenyl benzophenone, 2-ethylhexyl-4'-phenyl-benzophenone-2-carboxylate, 2-hydroxy-4-n-octoxy benzophenone  
10 and 4-hydroxy-3-carboxy benzophenone; 3-(4'-methylbenzylidene)-d,1-camphor, 3-benzylidene-d,1-camphor, urocanic acid, urocanic acid ethylester, 2-phenyl-5-methylbenzoxazol, 2,2'-hydroxy-5-methylphenylbenzotriazole, 2-(2'-hydroxy-5'-t-octylphenyl) benzotriazole, 2-(2'-hydroxy-5'-methylphenyl) benzotriazole,  
15 dibenzalazine, dianisoylmethane, 4-methoxy-4'-t-butyl dibenzoylmethane, rutin, hesperidin, quercetin, or derivatives thereof including saccharide derivatives. Examples of substances having UV-scattering effect are titanium oxide, zinc oxide, selenium oxide, zirconium oxide, iron oxide, or clay minerals such as kaolin,  
20 talc, mica and sericite. The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product and exert the UV-absorbing effect alone or in combination with other substances. It is usually 0.0001-40%, preferably 0.01-20% to the total amount of the external dermatological  
25 agent. In the case of less than 0.0001%, they are not expected to exert the desired effect. In the case of more than 40%, they are not dose-dependently effective.

Substances having emulsifying effect are not specifically restricted. One or more such substances can be freely chosen from

substances having detergent activity, which are illustrated with  
 non-ionic surfactants and/or ionic surfactants. Examples of non-ionic  
 surfactants are sorbitan fatty acid esters such as sorbitan monolaurate  
 and sorbitan sesquiosostearate; glycerin fatty acid esters such as  
 5 glycerin monooleate and glycerin monoisostearate; polyglycerin fatty  
 acid esters such as diglycerylmonooleate and decaglyceryl diisostearate;  
 polyoxyethylene sorbitan fatty acid esters such as polyoxyethylene  
 sorbitan monooleate (6 E.O.) and polyoxyethylene sorbitan monooleate  
 (20 E.O.); polyoxyethylene sorbit fatty acid esters such as  
 10 polyoxyethylene sorbit monolaurate (6 E.O.) and polyoxyethylene sorbit  
 tetraoleate (40 E.O.); polyoxyethylene glycerin fatty acid esters such  
 as polyoxyethylene glyceryl monooleate (5 E.O.) and polyoxyethylene  
 glyceryl monooleate (15 E.O.); polyethylene glycol fatty acid esters  
 such as polyoxyethylene monoisostearate (10 E.O.) and polyoxyethylene  
 15 monooleate (6 E.O.); polyethylene glycol difatty acid esters such as  
 polyoxyethylene diisostearate (8 E.O.) and polyoxyethylene  
 diisostearate (12 E.O.); polyoxyethylene alkyl ethers such as  
 polyoxyethylene oleyl ether (7 E.O.) and polyoxyethylene oleyl ether  
 (10 E.O.); polyoxyethylene polyoxypropylene alkyl ether such as  
 20 polyoxyethylene(1)polyoxypropylene(4)alkylether; and polyoxyethylene  
 castor oil/wax such as polyoxyethylene castor oil (20 E.O.) and  
 polyoxyethylene castor wax (40 E.O.). In addition, they include  
 propyleneglycol fatty acid esters or ethylene oxide derivatives,  
 polyetherdenaturation silicone, trehalose derivatives such as trehalose  
 25 mono-fatty acid esters, trehalose difatty acid esters, and saccharide  
 derivatives of trehalose and fatty acid esters thereof, sucrose fatty  
 acid esters, and saccharide derivatives such as alkylglucoside.

The ionic surfactants are classified into anionic, cationic  
 and amphoteric surfactants. Examples of the anionic surfactants are

higher fatty acids; alkyl sulfate esters such as alkyl benzene sulfate and  $\alpha$ -olefin sulfate; polyoxyethylene alkyl ether sulfate; acyl N-methyl taurinate; alkyl ether phosphate ester; N-acyl amino acids; alkyl amide phosphate; alkyl ether carbonate; salts thereof including alkali metal salts, alkaline earth metal salts, alkanolamin ion salts, ammonium ion salts and basic amino acid salts. Examples of cationic surfactants are alkyl trimethyl ammonium chloride, dialkyl dimethyl ammonium chloride, benzalkonium chloride, and alkyl benzyl methyl ammonium. Examples of amphotonic surfactants are betaine type amphotonic surfactants such as betaine alkyl dimethyl aminoacetate, betaine alkyl amide propyl demethyl aminoacetate and 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolium betaine; imidazoline type amphotonic surfactants; amino acid type amphotonic surfactants; and non-ionic surfactants such as polyoxyethylene type surfactants, polyalcohol ester type surfactants and ethylene oxide/propylene oxide block polymers. The substances having emulsifying effect also include high polymer type surfactants and substances having emulsifying effect such as polyvinyl alcohol, sodium alginate, starch derivatives, cyclodextrins, anhydrous crystalline maltose, tragacanth gum, lecithin, saponin, isoflavones, phosphatidyl serine, phosphatidyl ethanolamine and phosphatidyl choline.

The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product alone or in combination with other substances. It is usually 0.0001-50%, preferably 0.01-40% to the total amount of the external dermatological agent.

Substances having astringent effect are not specifically restricted as long as the substances have an astringent effect. Example of the substances are menthol, camphor, alum, chlorohydroxy aluminum,

ammonium chloride, allantoin aluminum salt, zinc sulfate, metal salts of ammonium sulfate such as aluminium potassium sulfate, zinc sulfophenate, naringin, naringin derivatives such as glycosyl-naringin, organic acid such as tannic acid, citric acid, lactic acid and succinic acid, in addition, plants or plants ingredients including gambir, *Sweet*  
5 *hydrangea leaf*, *Althea officinalis* root, aloe, fennel, rose fruit, St. John's wort, *Lamium album*, orange, sea weed, valerian, *Artemisa capillaris*, bramble, kiwi, gentian, *Geranium thunbergii*, Chinese gall nut, maybush, meadowsweet, white birch, crataegi fructus tree, bourtree,  
10 juniper, nosebleed, sage, thyme, tea leaf, *Potantilla tormentilla*, nettle, coltsfoot, grape, hop, horse chestnut, balm mint, cornflower, wormwood, apple, lemon, *Astragalus sinicus*, rosehip, *Lonicera japonica*, peony root, horse tail, clematis and ivy. The amount of the substances is not specifically restricted as long as the substances do not inhibit  
15 the functions of the functional powdery product and exert the astringent effect alone or in combination with other substances. It is usually 0.0003-10%, preferably 0.001-5% to the total amount of the external dermatological agent.

Substances having wrinkle-reducing effect are not specifically  
20 restricted as long as the substances have a wrinkle-reducing effect. Examples of the substances are retinoids (such as retinol, retinoic acid and retinal), pangamic acid, kinetin, ursolic acid, turmeric extract, sphingosine derivatives, silicon, silica, N-methyl-L-serine and mevalonolactone. The amount of the substances is not specifically  
25 restricted as long as the substances do not inhibit the functions of the functional powdery product and exert the wrinkle-reducing effect alone or in combination with other substances. It is usually 0.0003-10%, preferably 0.01-5% to the total amount of the external dermatological agent.

Substances having cell-activating effect are not specifically restricted as long as the substances have a cell-activating effect. Examples of the substances are amino acids such as  $\gamma$ -aminobutyric acid and  $\epsilon$ -aminocaproic acid, vitamins such as retinol, thiamine, riboflavin, pyridoxine chloride and pantothenic acids,  $\alpha$ -hydroxy acids such as glycolic acids and lactic acid; tannin; flavonoids; saponin; allantoin; KANKO-SO No.301; esculin, esculetin; esculetin derivatives; and plant components of "gagome" seaweed, rockweed, *Undaria pinnatifida*, "Ressoniku", *Nemacystus decipiens* or *Pterocladia capillacea*. The amount of the substances not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product are exert the cell activating effect alone or in combination with other substances. It is usually 0.0003-10%, preferably 0.001-5% to the total amount of the external dermatological agent.

Substances having transdermal absorption-promoting effect are not specifically restricted as long as the substances have a transdermal absorption-promoting effect. Examples of the substances are urea, lactic acid, fruit acids,  $\alpha$ -hydroxy acids such as glycolic acid, sulfur,  $\beta$ -hydroxy acids such as salicylic acid, oleic acid, undecanoic acid, octanol, nonanol, menthol, thymol, limonene, dimethyl sulfoxide (DMSO), dodecylmethyl sulfoxide, N,N-dimethylacetamide, N,N-dimethylformamide, sodium laurylsulfate, N,N-bis(2-hydroxyethyl) oleylamine, polyoxyethylene (20) sorbitan monooleate, dodecyl dimethyl ammoniopropylsulfate, propyleneglycol, polyethyleneglycol, N,N-dimethyl-m-toluamide, DEET (diethyl-m-toluamide), laurocapram, 1-dodecylazacycloheptane-2-one, isopropyl myristate, isopropyl palmitate, N-(mono or di)-p-mentane-3-carboxamide, 2-(2-methoxy-1-methylethyl)-5-methylcyclohexanol or azacycloalkane derivatives or

cyclodextrin. The above substances can be used in combination with other substances. The amount of the substances is not specifically restricted as long as the substances do not inhibit the functions of the functional powdery product and exert the cell activating effect alone or in  
5 combination with other substances. It is usually 0.0003-20%, preferably 0.001-10%, more preferably 0.01-5% to the total amount of the external dermatological agent.

The external dermatological agent of the present invention optionally comprises other ingredients used for usual external  
10 dermatological agent. Examples of the ingredients are powders; oils; fats; edetic acid; di-, tri- or tetra-sodium edetate; sodium citrate; oxycarbonic acids such as lactic acid and sodium lactate, or alkaline metal salts thereof; chelating agents such as ethylenediamine tetraacetate or alkaline metal or alkaline earth metal salts thereof  
15 and sodium metaphosphate; antioxidants such as butylhydroxy toluene (BHT), butylhydroxy anisol (BHA) and propyl gallate; water; alcohols such as ethanol and isopropanol; oily substances such as liquid paraffin, vaseline, microcrystalline wax, squalane, ceramide, sweet almond oil, olive oil, hardened oil, castor oil, Japan wax, coconut oil, bees was,  
20 lanolin, carnauba wax and palm oil; sterols such as phytosterol, fatty acids such as lanolic acid, myristic acid, palmitic acid, stearic acid, isostearic acid and oleic acid, or triglyceride thereof; higher alcohols such as lauryl alcohol, cetanol, stearyl alcohol, oleyl alcohol and cholesterol; esters such as isopropyl myristate, myristyl myristate  
25 and isopropyl palmitate; other inorganic or organic acids such as phosphoric acid,  $\alpha$ -hydroxy acids including citric acid, malic acid, tartaric acid, lactic acid and succinic acid, acetic acid, or salts thereof; inorganic or organic alkaline agent such as sodium hydrate, potassium hydrate and triethanolamine, or salts thereof (pH adjusting



agent); fullerene or derivatives thereof; colorants such as yellow iron oxide, titan yellow and carthamin; vitamins such as thiamine, nicotinamide, riboflavin, L-ascorbic acid, pyrrolo-quinoline quinone, carotenoide, ergosterol and tocopherol; naringin; glycosyl-naringin; 5 photosensitizing dyes such as *KANKO-SO* No.101 (platonin), *KANKO-SO* No.301 (takanal), *KANKO-SO* No.401 and plarumin; tar colorants such as Red No.104, Yellow No.4, Yellow No.5, Green No.3, Blue No.1, Blue No.2, Red No.202, Red No.226, Red No.227, Red No.230, Orange No.206, Orange No.207, Yellow No.202, Green No.201, Green No.204, Blue No.201 and Green 10 No.205, synthetic lake colorants from carminic acid, laccaic acid, carthamin, brazilin and crocin; natural colorants; ingredients used in bath salts such as sulfur, sodium bicarbonate, sodium chloridemint, mineral spring, sodium carbonate, sinter, borax, *Cnidium rhizome*, Japanese angelica root and *Schizonepetae herba*.

15           The oils and fats are not specifically restricted. Examples of the oils and fats are synthetic oils or fats such as medium chain triglyceride; plant oils or fats such as soybean oil, rice oil, rape oil, cotton oil, sesame oil, safflower oil, castor oil, olive oil, cacao oil, camellia oil, sunflower seed oil, palm oil, linseed oil, perilla 20 oil, shea oil, sal oil, coconut oil, Japan wax, jojoba oil, grape seed oil and avocado oil; animal oils or fats such as mink oil, egg yolk oil, beef tallow, milk fat and lard; waxes such as bees wax, spermaceti, lanolin, carnauba wax and candelilla wax; hydrocarbons such as liquid paraffin, squalene, squalane, microcrystalline wax, ceresin wax, 25 paraffin wax and vaseline; natural and synthetic fatty acid such as lauric acid, myristic acid, stearic acid, oleic acid, isostearic acid and behenic acid; natural and synthetic higher alcohols such as cetanol, stearyl alcohol, hexyl decanol, octyl decanol and lauryl alcohol; esters or ethers such as isopropyl myristate, isopropyl palmitate, octyldodecyl

myristate and cholesteryl oleate; and silicone oil.

The external dermatological agent can be used in combination with one or more members selected from the group consisting of lymphokines such as interferon- $\alpha$ , interferon- $\beta$ , interferon- $\gamma$ , tumor necrosis factor- $\alpha$ , tumor necrosis factor- $\beta$ , macrophage migration inhibitory factor, colony stimulating factor, transfer factor and interleukin-2; hormones such as insulin, growth hormone, prolactin, erythropoietin, follicle stimulating hormone and steroids; antibiotics such as penicillin, erythromycin, chloramphenicol, tetracycline, streptomycin and kanamycin sulfate; immune regulating agents; immune activating agents; hemostatic agents; enzymes such as lipase, elastase, urokinase, protease,  $\beta$ -amylase, isoamylase, glucanase and lactase; plant extracts including fungus or herbs such as ginseng, aloe, mallow, iris, grape seed, coix seed, balm mint, nosebleed, loofah, lily, phellodendron bark, peony root, sialid, birch, loquat, chlorella, propolis extract, agariks, *Ganoderma lucidum*, deer horn shape *Ganoderma lucidum* and *Phellinus linteus*; animal extracts such as snapping turtle extract; seaweed extract such as *Enteromorpha compressa* extract and yellow green laver extract; flavangenol; royal jelly; galenicals; high intensity sweeteners such as dihydrochalcone, stevioside,  $\alpha$ -glycosyl stevioside, rebaudioside, glycyrrhizin, L-aspartyl-L-phenylalanine methyl ester, acesulfame-K and sucralose, saccharin; minerals or compounds thereof such as calcium, magnesium, iron, manganese, cobalt, copper, zinc, phosphorus, selenium, fluorine and iodine; waters such as electron water, magnetized water, ionized water and clustered water.

If necessary, the external dermatological agent can also comprise one or more substances used for pharmaceuticals, quasi-drugs, cosmetics or toiletries, described in "Japanese Standard of Cosmetic

Ingredients", "Supplement to the Japanese of Cosmetic Ingredients codex",  
"Japanese Cosmetic Ingredients Codex by Category", "Japanese Quasi-drug  
Ingredients Codex", "The Japanese Pharmacopoeia", "Supplement to the  
Japanese Pharmacopoeia codex", "Japanese Standards of Pharmaceutical  
5 Additive", "Japanese Standards of Herbal Medicine", "The Japanese  
Standards of Food Additives", "Latest Cosmetic Science (*Saishin Keshohin  
Kagaku*), revised and enlarged edition II", published by The *Yakuji Nippo*  
Ltd, in July 10, 1992, "New Cosmetology (*Shin Keshohingaku*)", published  
by *Nanzando Co. Ltd.*, in January 18, 2002, or "Cosmetic and Toiletry  
10 Formulation, 2nd edition", Vol. 8, published by William Andrew Publisher,  
in 2001. Examples of such ingredients are pharmaceuticals, excipients,  
bases, emollients, cooling agents, astringents, refrigeratives,  
surfactants, emulsifiers, dispersing agents, solubilizing agents,  
solvents, alkaline chemicals, thichening agents, gums, film-forming  
15 agents, foaming agents, antifoaming agents, perfumeries, coloring agents,  
gloss-imparting agents, stabilizers, antiseptics, bactericides,  
discoloration inhibitory agents, antioxidants, hair treating agents,  
humectants, hair-protecting agents, tricyst activator agents,  
antielectrostatic agents, auxiary agents, solvents, solubilizing agents,  
20 plasticizers, suspending agents, buffering agents, sweeteners,  
refrigeratives, sweetening agents, binders, absorbents, propellants,  
coating agents, masticatories, fillers, softeners, adjusters, chelating  
agents, discoloration inhibitory agents, oils, fats, oil-soluble polymer,  
inorganic or organic pigments, inorganic or organic pigments treated  
25 with silicone or fluoro compounds, pigments such as organic dyes,  
photosensitizing dyes such as rumin, waxes, pore constraction agents,  
antiperspirants, deodorants, anti-wrinkle agents, anti-dandruff agents,  
sebum secretion inhibitors, antiseborrheic agents, horny layer removers,  
horny layer resolving agents, parakeratosis inhibitors, analgestics,

torpents, antiplasmic agents, nutritional supplements, antiandrogenic agents, antihistamic agents, collagenase inhibitors, elastase inhibitors, hyaluronidase inhibitors, fibroblast activating agents, collagen-production promoting agents, tyrosinase inhibitors, 5 anti-allergic agents, and hemastatic agents. If necessary, usual food ingredients can be used. The above ingredients can be used in any amount for the external dermatological agent of the present invention as long as they do not affect the desired effects of the present invention.

The term "external dermatological agent" as referred to as in 10 the present invention includes cosmetics, quasi-drugs or pharmaceuticals, and further includes chemical products, industrial products, commodities and sundries having a possibility to directly contact with skins. Any form of the external dermatological agent can be used; which illustrated with solution form, resolvable form, emulsion form, powder-dispersion 15 form, water-oil form, water-powder form or water-oil-powder form. The functional powdery product of the present invention can be freely used as base cosmetic, finishing cosmetic, skin cosmetic, cleansing cosmetic, face wash, toilet water, cream, milky lotion, pack, foundation, face powder, powder, rouge, eyebrow, eye and cheek care cosmetic, perfume, 20 bath cosmetic, oral care cosmetic, tanning cosmetic, sun care cosmetic, makeup cosmetic, nail cosmetic, eye liner cosmetic, mouse and lip care cosmetic, oral care cosmetic, facial care cosmetic, cosmetic oil, fragrant cosmetic, body care cosmetic, hair care cosmetic, hair wash cosmetic, cosmetic soap, medicated soap, toothpaste, oral refrigerative, 25 hircismus blocker, bath dusting powder, hair growth promoter, tonic, shaving cosmetic, sun screen, antiitching agent, wiping and cleaning agent, bactericide, disinfectant, decolorant and depilatory, further, preventing or treating agent for athlete's foot, hemorrhoids, acnes, wounds, burns, chilblains, rashes, festers, inflammations, infections,

allergies, atopic diseases, ulcers or tumors in the form of a toilet water, lotion, milky lotion, cream, ointment, plaster, suspension, emulsion, paste, mousse, tic, solid, semisolid, powder, solid powder, mid-container forming powder, block, pencil, stick, jelly, gel, aerosol, spray, lozenge, pack or facemask. Examples of such cosmetics are cosmetic soaps, face cleansing creams, cleansing foams, cleansing creams, cleansing milks, cleansing lotions, cleansing oils, massage creams, cold creams, moisture creams, vanishing creams, hand creams, moisture lotions, cosmetic oils, liquid foundations, powder foundations, cake foundations, stick foundations, oily compact foundations, creamy foundations, cheek blushers, emulsified foundations, foundation cosmetics, body powders, creamy face powders, face powders, liquid face powders, solid face powders, paste face powder, talcum powder, loose shadows, baby powders, cheek colors, pencils, mascaras, lipsticks, lip creams, packs, shaving creams, after shaving creams, lotions, hand lotions, shaving lotions, after shaving lotions, sun screen creams, tanning oils, sun screen lotions, tanning lotions, softening toilet waters, astringent toilet waters, cleansing toilet waters, multi-layer toilet waters, facial shampoos, body shampoos, hair shampoos, hair-washing powders, hand soaps, facial rinses, body rinses, hair rinses, hair treatments, pilatories, tonics, tics, pomades, hair creams, hair liquids, hair tonics, set lotions, combing oils, combing oils for side hair, hair sprays, hair mousses, hair tonics, hair dyes, hair bleachers, color rinses, color sprays, permanent wave liquids, press powders, loose powders, eye creams, eye shadows, cream eye shadows, powder eye shadows, eye liners, eye blow pencils, mascaras, depilatory creams, perfumes, kneaded perfumes, powder perfumes, eau de cologne, deodorants, bath preparations, bath oils, bath salts, cosmetic oils, baby oils, nail colors, enamels, enamel removers, nail treatments, mouse washes,

toothpastes, tooth powders, insect repellents, ointments for treating wounds, antibacterial creams, steroid ointments, and further, cataplasms in the form of sheet or film, laundry soaps or detergents for clothes, detergents for flower, detergents for kitchen and cleansers. Because  
5 the functional powdery product of the present invention is capable of easily and uniformly admixing ceretone glycoside, hesperidin glycoside, naringenin glycoside and/or ascorbic acid glycoside with the external dermatological agent in the form of powder, solid or solid powder, it is more advantageously used in such case.

10           Following experiments concretely explain UV-absorbing ability of the functional powdery product of the present invention.

#### Experiment 1

##### Effect of glycosyl-rutin, supported on cellulose powder, on 15 UV-absorption property

Following experiment was carried out to examine the effect of glycosyl-rutin, a vitamin P glycoside, supported on cellulose powder, on UV-absorption property. A functional powdery product, supporting glycosyl-rutin in an amount of 2.5% by weight to the total weight, prepared  
20 in the following Example 1, was injected into a cell for powdery sample to be fixed, and subjected to the diffused lighting system (condition:  $d(n-D)[0/d]$ ) providing by Japanese Industrial Standards (Z 8722:2002, corresponding to the measurement of object color specified in items 1-3 in COLORIMETRY SECOND EDITION Publication CIE No.15.2, (1986)  
25 recommended by the International Commission on Illumination) using a spectrophotometer ("U-best 50" equipped with an integration sphere device (TIS-417 type), produced by JASCO Corporation) in order to measure spectral reflection of captured, diffusion-reflection light in an integral sphere. As a control, a sample consisting of cellulose powder

and a sample prepared by uniformly mixing 2.5 parts by weight of glycosyl-rutin, which was the same as glycosyl-rutin supported on the cellulose powder, with 97.5 parts by weight of cellulose powder were similarly subjected to the above measurement for spectral reflection.

5 The result is shown in FIG. 1.

As is evident from the result in FIG. 1, the cellulose powder supporting glycosyl-rutin had lower in a reflection of ultraviolet in the range of UV-B and UV-A than that of the cellulose powder or the mixture of cellulose powder and glycosyl-rutin, revealing that it  
10 effectively absorbs ultraviolet ray (UV). Although the enhancing mechanism of such absorption is not clear, it can be thought that the cellulose powder, uniformly supporting glycosyl-rutin on its surface, more efficiently absorbs UV than the powder of glycosyl-rutin, having a big particle size, dispersed in the cellulose powder used as a carrier.

15

## Experiment 2

### Effect of glycosyl-rutin, supported on silk powder, on UV-absorption property

Following experiment was carried out in order to examine the  
20 effect of glycosyl-rutin supported on silk powder on UV-absorption property. A functional powdery product, supporting glycosyl-rutin in an amount of 10% by weight to the total weight, prepared in the following Example 2, was injected into a cell for powdery sample to be fixed, and measured their spectral reflection according to Experiment 1. The  
25 result is shown in FIG. 2.

As is evident from the result in FIG. 2, the silk powder supporting glycosyl-rutin had lower a reflection of UV in the range of UV-B and UV-A than that of the silk powder or the mixture of silk powder and glycosyl-rutin, revealing that it effectively absorbs ultraviolet ray.

The results of Experiments 1 and 2 revealed that the cellulose powder more efficiently absorb ultraviolet than the silk powder when used as carriers in such a manner of being supported on a smaller amount of glycosyl-rutin.

5           The following Examples explain in detail the functional powdery products, additives containing the same for external dermatological agents, external dermatological agents incorporated with the additives containing the functional powdery products or the additives for external dermatological agent in detail. The present invention should not be  
10 restricted by the Examples.

#### Example 1

##### Functional powdery product

Twenty grams of crystalline cellulose ("AVICEL PH-M06",  
15 commercialized by Asahi Kasei Corporation) was admixed with 45 ml of purified water, stirred at an inner temperature of 10-15°C, admixed once with 5 ml of purified water containing 1 g of glycosyl-rutin ("αG-RUTIN", commercialized by Hayashibara Biochemical Laboratories, Inc.), and stirred at the same temperature for two hours. After the  
20 resulting solution was stirred at an ambient temperature for one hour, 19.5 g of the functional powdery product supporting glycosyl-rutin was collected by filtration and dried. 57.5 mg of the resulting dried functional powdery product was weighed and placed into a 50-ml volume of measuring flask, and then admixed and filled up with a solution  
25 containing ion exchanged water/ethanol (60/40(v/v%)). The resulting solution was stirred by magnetic stirrer for 20 minutes to solve out the supported glycosyl-rutin. After removing insoluble powder by natural filtration, the resulting solution was subjected to measurement of absorbance at near 360 nm corresponding to absorption maximum of



glycosyl-rutin using quartz glass cell with 1 cm of light path length to obtain 0.6509 of absorbance value and calculate 5.55 of chromatic valence ( $E^{1\%}$ ). Chromatic valence of glycosyl-rutin used for coloring was 227. Therefore, the content rate of glycosyl-rutin in the obtained functional powdery product was calculated by 2.5 % to total weight of the functional powdery product.

#### Example 2

##### Functional powdery product

Twenty grams of silk powder ("SILK POWDER H", commercialized by Kanebo Ltd.) was admixed with 150 ml of purified water, stirred, admixed with 10 ml of purified water containing 6.4 g of glycosyl-rutin (" $\alpha$ G-RUTIN", commercialized by Hayashibara Biochemical Laboratories, Inc.) used in Example 1, and stirred for about one hour. 19.2g of the functional powdery product supporting glycosyl-rutin was collected by filtration and dried. Since the product had chromatic valence of 23.3, the content rate of glycosyl-rutin in the obtained functional powdery product was calculated by 10 % to total weight of the functional powdery product.

#### Example 3

##### Functional powdery product

Twenty grams of crystalline cellulose ("AVICEL PH-M06", commercialized by Asahi Kasei Corporation) was admixed with 45 ml of purified water, stirred at an inner temperature of 90°C, admixed with 5 ml of purified water containing 1 g of glycosyl-hesperidin (" $\alpha$ G-HESPERIDIN", commercialized by Hayashibara Biochemical Laboratories, Inc.), and stirred for one hour. After cooling down, 19.3 g of the functional powdery product supporting glycosyl-hesperidin was

collected by filtration and dried. The chromatic valence was 5.49.

#### Example 4

##### Functional powdery product

5            19.7g of the functional powdery product supporting  
glycosyl-hesperidin ("αG-HESPERIDIN", commercialized by Hayashibara  
Biochemical Laboratories, Inc.) obtained according to the method in  
Example 2 except of using chitosan instead of crystalline cellulose.  
The product had chromatic valence of 8.48.

10

#### Example 5

##### Functional powdery product

            Twenty grams of crystalline cellulose ("AVICEL PH-M06",  
commercialized by Asahi Kasei Corporation) was admixed with 45 ml of  
15    purified water, stirred at an inner temperature of 10-15°C, admixed  
once with 5 ml of purified water containing 0.5 g of glycosyl-rutin  
("αG-RUTIN", commercialized by Hayashibara Biochemical Laboratories,  
Inc.) and 0.5 g of glycosyl-hesperidin ("αG-HESPERIDIN", commercialized  
by Hayashibara Biochemical Laboratories, Inc.), and stirred at the same  
20    temperature for 2 hours. After stirring the resulting solution at an  
ambient temperature, 19.0 g of the functional powdery product supporting  
glycosyl-rutin and glycosyl-hesperidin was collected by filtration and  
dried.

#### 25    Example 6

##### Functional powdery product

            Twenty grams of crystalline cellulose ("AVICEL PH-M06",  
commercialized by Asahi Kasei Corporation) was admixed with 45 ml of

purified water, stirred at an inner temperature of 90°C, admixed with 7 ml of solution prepared by dissolving 1 g of glycosyl-naringin, prepared by the method disclosed in Example A-2 in patent literature No.3, in 7 ml of purified water heated at 100°C and cooling to 90°C, and stirred  
5 for about one hour. 19.2 g of the functional powdery product supporting glycosyl-naringin was collected by filtration and dried.

#### Example 7

##### Functional powdery product

10 Twenty grams of crystalline cellulose ("AVICEL PH-M06", commercialized by Asahi Kasei Corporation) was admixed with 45 ml of purified water, stirred at an inner temperature of 30°C, admixed with 3 ml of purified water prepared by dissolving 1 g of L-ascorbic acid 2-glucoside (commercialized by Hayashibara Biochemical Laboratories,  
15 Inc.) and heating at 30°C, and stirred for about one hour. 19.0 g of the functional powdery product supporting L-ascorbic acid 2-glucoside was collected by filtration and dried.

#### Example 8

##### 20 Additives containing the functional powdery products for external dermatological agent

Two parts by weight of any one of the functional powdery product, prepared in Examples 1-7, was homogeneously admixed with one part by weight of  $\alpha,\alpha$ -trehalose monohydrate cosmetic grade (commercialized by  
25 Hayashibara Biochemical Laboratories, Inc.) and one part by weight of ascorbic acid 2-glucoside (commercialized by Hayashibara Biochemical Laboratories, Inc.) to obtain additives for external dermatological agent, which contains the functional powdery product supporting glycosyl-rutin, glycosyl-hesperidin, glycosyl-naringin and/or

ascorbic acid 2-glucoside. Since the product contains  $\alpha,\alpha$ -trehalose, the functional powdery product is inhibited in solidification, hygroscopicity and deterioration. The product can be used alone as a raw material for external dermatological agent in a powdery, solid or solid powdery form. In case of other forms, it can be incorporated in an external dermatological agent by a suitable method depending on their forms.

#### Example 9

#### 10 Additives containing the functional powdery products for external dermatological agent

Any one of the functional powdery products, prepared in Examples 1-7, was homogeneously admixed with equal amount of saccharide derivatives of  $\alpha,\alpha$ -trehalose powder to obtain additives for external dermatological agent, which contains the functional powdery product supporting glycosyl-rutin, glycosyl-hesperidin, glycosyl-naringin and/or ascorbic acid 2-glucoside. Since the product contains saccharide derivatives of  $\alpha,\alpha$ -trehalose, the functional powdery product is inhibited in solidification, hygroscopicity and deterioration. The product can be used alone as a raw material for external dermatological agent in a powdery, solid or solid powdery form. In case of other forms, it can be incorporated in an external dermatological agent by a suitable method depending on their forms.

The above powdery saccharide derivatives of  $\alpha,\alpha$ -trehalose used in Example 9 for external dermatological agent was prepared by the following method. A corn starch was prepared into an about 20% of starch suspension, admixed with calcium carbonate to give a final concentration of 0.1%, and adjusted to pH 6.5. The resulting solution was admixed

with 0.2%/g-starch on a dry solid basis of "TERMAMYL 60L", an  $\alpha$ -amylase commercialized by NovoZyme A/S, Bagsværd, Denmark, and followed by the enzyme reaction at 95° C for 15 minutes. After autoclaved at 120° C for 10 minutes, the resulting reaction mixture was cooled to 50° C, adjusted  
5 to pH 5.8, admixed with 5 units/g-starch of maltotetraose-forming amylase disclosed in Japanese Patent Kokai No. 240,784/88, commercialized by Hayashibara Biochemical Laboratories Inc., Okayama, Japan, and 500 units/g-starch of isoamylase commercialized by Hayashibara Biochemical Laboratories Inc., and followed by the enzymatic reaction for 48 hours.  
10 The reaction mixture was further admixed with 30 units/g-starch of "α-AMYLASE 2A",  $\alpha$ -amylase commercialized by Ueda Chemical Industries Co., Ltd. and followed by the enzyme reaction at 65° C for four hours. After autoclaved at 120° C for 10 minutes, the reaction mixture was cooled to 45° C, admixed with 2 units/g-starch of a non-reducing  
15 saccharide-forming enzyme originated from *Arthrobacter sp.* Q36 (FREM BP-4316), disclosed in Japanese Patent Kokai No. 143,876/95, and followed by an enzymatic reaction for 48 hours. The reaction mixture was kept at 95° C for 10 minute, cooled and filtered to obtain a filtrate. According to conventional manner, the resulting filtrate was decolored with  
20 activated charcoal, desalted and purified with ion exchangers in H- and OH- forms, and concentrated into 70% syrup in a yield of about 90% to the material starch on a dry solid basis. The syrup contained about 53% of  $\alpha,\alpha$ -maltosyl  $\alpha,\alpha$ -trehalose, 10% of other saccharide derivatives of  $\alpha,\alpha$ -trehalose, about 37% sugar alcohols such as sorbitol, maltitol,  
25 maltotriitol and maltotetraitol. The syrup was spray-dried in a usual manner to obtain powdery saccharide derivatives of  $\alpha,\alpha$ -trehalose.

<External dermatological agent containing the functional powdery

product>

Example 10

Powder foundation

	Titanium oxide	5 parts by weight
5	Anhydrous silic acid	2 parts by weight
	Corn starch	4 parts by weight
	$\alpha$ -Maltotriosyl $\alpha,\alpha$ -trehalose (produced by Hayashibara Biochemical Laboratories, Inc.)	1 part by weight
10	Silicon oil	2 parts by weight
	Diisostearylmalate	1 part by weight
	Neo-pentylglycol dioctanate	1 part by weight
	Squalane	2 parts by weight
	Functional powdery product supporting	1 part by weight
15	glycosyl-rutin, prepared in Example 1	
	Functional powdery product supporting	3 parts by weight
	glycosyl-naringin, prepared in Example 6	
	Silicon powder	10 parts by weight
	Sericite	68 parts by weight

20           According to the above formula, a powder foundation was produced  
in a usual manner. Since the product contains the functional powdery  
product supporting glycosyl-rutin and glycosyl-naringin,  
glycosyl-rutin and glycosyl-naringin kept on or gradually released from  
the functional powdery product absorb UV to inhibit the productions  
25 of active oxygen and lipid peroxides in skins. Therefore, it can be  
used for the purpose of inhibiting the generation of wrinkles of face  
including expression wrinkles and continues the effect on inhibiting  
aging of skins, and keeps elasticity and no dullness of skins. The product  
is also advantageously in view of safety because of suppressing rough

skin or inflammation due to anti-inflammatory activity of glycosyl-rutin and glycosyl-naringin.

Example 11

5	<u>Powder foundation</u>	
	Talc	20 parts by weight
	Mica	33 parts by weight
	Caolin	7 parts by weight
	Nylon powder	10 parts by weight
10	Titanium dioxide	10 parts by weight
	Mica titanium	3 parts by weight
	Zinc stearate	1 part by weight
	Red oxide of iron	1 part by weight
	Yellow oxide of iron	1 part by weight
15	Water-insoluble chitosan powder	3 parts by weight
	supporting Shikon black dye	
	Additive for dermatological external	4 parts by weight
	agent containing the functional powdery	
	product supporting glycosyl-hesperidin,	
20	prepared in Example 9	
	Squalane	6 parts by weight
	Lanolin acetate	1 part by weight
	Octyldodecyl myristate	2 parts by weight
	Perfumeries	suitable amount
25	Antiseptics	suitable amount

According to the above formula, a powder foundation was produced in a usual manner. Since the product contains the functional powdery product supporting glycosyl-hesperidin, the glycosyl-hesperidin kept on or gradually released from the functional powdery product absorb

UV to inhibit the productions of active oxygen and lipid peroxides in skins. Therefore, it can be used for the purpose of inhibiting the generation of wrinkles of face including expression wrinkles and continues the effect on inhibiting aging of skins, and keeps elasticity and no dullness of skins. The product is a solid powder cosmetic having satisfactory gloss and no sticky feeling, easily softening off its color, having satisfactory adhesion feeling and no light of a membranous oil, further hardly dissolved by sweat or sebum and having satisfactory long-lasting and skin feeling. The product is also advantageous in view of safety because of suppressing rough skin or inflammation due to anti-inflammatory activity of glycosyl-rutin and glycosyl-naringin.

#### Example 12

##### Foundation

15	Purified water	66 parts by weight
	Glycerin	4.7 parts by weight
	Additive containing the functional powdery product supporting glycosyl-hesperidin for external dermatological agent, prepared in Example 9	7 parts by weight
20	Propyleneglycol	7 parts by weight
	Titanium dioxide	2 parts by weight
	Squalane	3 parts by weight
	Cetyl-2-ethylhexanoate	3 parts by weight
25	Vaseline	1 part by weight
	Red oxide of iron	0.01 part by weight
	Yellow oxide of iron	0.01 par by weight
	Water-insoluble chitosan powder supporting shikon dye produced according to the method	0.07 part by weight



described in Example 1 in Japanese Patent  
No.2815026 specification (produced by  
Hayashibara Biochemical Laboratories, Inc.)

	Sodium hexametaphosphate	0.01 part by weight
5	Sodium hydroxide	0.2 part by weight
	Cetostearyl alcohol	3 parts by weight
	Stearic acid	2 parts by weight
	Glycerylmonostearate	2 parts by weight
	Perfumeries	suitable amount
10	Antiseptics	suitable amount

According to the above formula, a foundation was produced in  
a usual manner. Since the product contains the functional powdery  
product supporting glycosyl-hesperidin, the glycosyl-hesperidin kept  
on or gradually released from the functional powdery product absorb  
15 UV to inhibit the productions of active oxygen and lipid peroxides in  
skins. Therefore, it can be used for the purpose of inhibiting the  
generation of wrinkles of face including expression wrinkles and  
continues the effect on inhibiting aging of skins, and keeps elasticity  
and no dullness of skins. Since the product also contains saccharide  
20 derivatives of  $\alpha,\alpha$ -trehalose, it is a satisfactory cosmetic foundation  
without sticky feeling. The product is advantageous in view of safety  
because of suppressing rough skin or inflammation due to  
anti-inflammatory activity of glycosyl-hesperidin. Further, it has so  
satisfactory thermostability that its smell and shape are not changed  
25 even if kept at a high temperature for a long period of time.

### Example 13

#### Eyeline

Vinyl acetate plastic emulsion	45 parts by weight
--------------------------------	--------------------

	Glycerin	3 parts by weight
	Saccharide derivatives of $\alpha,\alpha$ -trehalose	2 parts by weight
	in a syrupy form used in Example 9	
	Carboxymethylcellulose	2 parts by weight
5	(10% aqueous solution)	
	Polyoxyethylene sorbitan monooleate ester	1 part by weight
	Purified water	19 parts by weight
	Chitosan powder supporting shikon black dye	15 parts by weight
	("SHIKON BLACK CHITOFINE POWDER", produced by	
10	Hayashibara Biochemical Laboratories, Inc.)	
	Powder consisting of silk powder supporting	1 part by weight
	gardenia dye ("UJO GARDENIA POWDER",	
	commercialized by Hayashibara Biochemical	
	Laboratories, Inc.)	
15	Additive for external dermatological agent,	2 parts by weight
	containing the functional powdery product	
	supporting glycosyl-hesperidin, prepared	
	in Example 8	
	Perfumeries	suitable amount
20	Antiseptics	suitable amount

According to the above formula, eyeliner was produced in a usual manner. Since the product contains the functional powdery product supporting glycosyl-hesperidin, the glycosyl-hesperidin kept on and gradually released from the functional powdery product absorbs UV to

25 inhibit the productions of active oxygen and lipid peroxides in skins and increase blood-flow in skins of eye's edge and round thereof. Therefore, it can be used for the purpose of inhibiting the generation of wrinkles of face including expression wrinkles and continues the effect on inhibiting aging of skins, and keeps elasticity and no dullness

of skins. Since the product also contains saccharide derivatives of  $\alpha,\alpha$ -trehalose, it is a satisfactory cosmetic foundation without sticky feeling. The product is advantageously in view of safety because of suppressing rough skin or inflammation due to anti-inflammatory activity of glycosyl-hesperidin. Further, it has so satisfactory thermostability that its smell and shape are hardly changed even if kept at a high temperature for a long period of time.

#### Example 14

##### 10 Sunscreen

	Purified water	35 parts by weight
	1,3-Butyleneglycol	5 parts by weight
	Squalane paramethoxycinnamic octyl	6 parts by weight
	Oxybenzene	3 parts by weight
15	Hydrophobic treating titanium dioxide	3 parts by weight
	Glycerin diisostearate	3 parts by weight
	Ascorbic acid 2-glucoside (Commercialized by Hayashibara Biochemical Laboratories, Inc.)	2 parts by weight
	Powder consisting of water-insoluble chitin	0.5 part by weight
20	supporting shikon black dye ("SHIKON CA BLACK CHITOFINE POWDER", commercialized by Hayashibara Biochemical Laboratories, Inc.)	
	Additive containing the functional powdery product supporting glycosyl-rutin, prepared	3 parts by weight
25	in Example 9	
	Organic-modified montmorillonite	1.5 parts by weight

According to the above formula, a sunscreen was produced in a usual manner. Since the product contains the functional powdery product supporting glycosyl-rutin kept on or gradually released from

the functional powdery product absorbs UV to inhibit the productions of active oxygen and lipid peroxides in skins and prevents sunburn. Therefore, it can be used for the purpose of inhibiting the generation of wrinkles of face including expression wrinkles and continues the effect on inhibiting aging of skins, and keeps elasticity and no dullness of skins. Since the functional powdery product absorbs UV, it is a satisfactory inhibiting effect on sunburn. The product is advantageous in view of safety because of suppressing rough skin or inflammation due to anti-inflammatory activity of glycosyl-rutin.

10

#### Example 15

#### Lipstick

	Functional powdery product supporting glycosyl-hesperidin, prepared by the method	1 part by weight
15	in Example 3	
	Titanium dioxide	3.5 parts by weight
	Blue No.1	1 part by weight
	Black iron oxide	0.1 part by weight
	Red iron oxide	1.5 parts by weight
20	Castor oil	25 parts by weight
	Candelilla wax	8 parts by weight
	Solid paraffin	8 parts by weight
	Yellow beewax	5 parts by weight
	Carnauba wax	5 parts by weight
25	Lanoline	11 parts by weight
	Cetyl-2-ethylhexanoate	20 parts by weight
	Isopropylmyristate	10 parts by weight
	Antioxidant	suitable amount
	Perfumeries	suitable amount

According to the above formula, a lipstick was prepared by a conventional method. Since the product comprises a functional powdery product supporting glycosyl-hesperidin, glycosyl-hesperidin on the functional powdery product or that gradually releasing from the functional powdery product absorb ultraviolet radiation, increase vascular flow of rip and skin around rip, and inhibit the generation of active oxygen and lipid peroxide. Therefore, since the product inhibits the formation of wrinkles of rip and skin around rip and keeps aging-retardant effects for a long period of time, it can be used for keeping rip condition to exhibit good texture and no wrinkles and dullness. Further, since glycosyl-hesperidin exhibits anti-inflammatory effect, the product has a satisfactory safety without causing skin roughness and inflammation even when applied on rip. Furthermore, the product has a satisfactory thermal stability without causing deterioration of scent and deformation even when leaved under a high-temperature condition for a long period of time.

#### Example 16

##### Lipstick

20	Functional powdery product supporting glycosyl-rutin, prepared by the method in Example 2	1 part by weight
	Titanium oxide	3.5 parts by weight
	Red No.201	0.5 part by weight
25	Red No.202	2 parts by weight
	Red No.223	0.05 part by weight
	Candelilla wax	8 parts by weight
	Castor oil	30 parts by weight
	Cetyl-2-ethylhexanoate	20 parts by weight

	Cerecin	4 parts by weight
	Carnauba wax	2 parts by weight
	Lanoline	11 parts by weight
	Isostearic acid diglyceride	40 parts by weight
5	Polyoxyethylene (25) polyoxypropylene (20)	
	2-tetradecylether	1 part by weight
	Saccharide-derivative of $\alpha,\alpha$ -trehalose	2 parts by weight
	in a syrupy form, used in Example 9	
	Glycosyl-hesperidin	1 part by weight
10	Purified water	4 parts by weight

According to the above formulation, a lipstick was prepared by a conventional method. Since the product comprises a functional powdery product supporting glycosyl-rutin, glycosyl-hesperidin on the functional powdery product or that gradually releasing from the functional powdery product and/or glycosyl-hesperidin absorb ultraviolet radiation, increase vascular flow of rip and skin around rip, and inhibit the generation of active oxygen and lipid peroxide. Therefore, since the product inhibits the formation of wrinkles of rip and skin around rip and keeps aging-retardant effects for a long period of time, it can be used for keeping rip condition to exhibit good texture and no wrinkles and dullness. Also, since the product comprises saccharide-derivatives of  $\alpha,\alpha$ -trehalose, it gives a good gloss, nonsticky, and a satisfactory makeup-retaining effect and sense of use. In addition, saccharide-derivatives of  $\alpha,\alpha$ -trehalose, glycosyl-rutin and glycosyl-hesperidin exhibit antioxidative effect and anti-inflammatory effect, the product has a satisfactory safety without causing skin roughness and inflammation even when applied on rip. Furthermore, a solid powdery cosmetic of the present invention has a

satisfactory thermal stability without causing deterioration of scent and deformation even when leaved under a high-temperature condition for a long period of time.

5    Example 17

Eye shadow

	Talc	45 parts by weight
	Mica	15 parts by weight
	Sericite	5 parts by weight
10	Water-insoluble chitosan powder supporting shikonin prepared by the method described in Japanese Patent No. 2,815,026 (produced by Hayashibara Biochemical Laboratories Inc., Okayama, Japan)	12 parts by weight
15	Black ferric oxide	3 parts by weight
	Pearl pigment	10 parts by weight
	Functional powdery product supporting for glycosyl-naringin, prepared by the method in Example 6	2 parts by weight
20	Liquid paraffin	6 parts by weight
	Methylpolysiloxane	2 parts by weight
	Sesquioreic acid sorbitan	2 parts by weight

     According to the above formula, an eye shadow was prepared by  
25 a conventional method. Since the product comprises functional powdery product supporting glcosyl-naringin, glycosyl-naringin on the functional powdery product or that gradually releasing from the functional powdery product absorb ultraviolet radiation, inhibit the generation of active oxygen and lipid peroxide of eyelid, tail of eye

and skin around them , and strengthen cappillary vessel. Therefore, since the product inhibits the formation of wrinkles and sagging of eyelids and keeps aging-retardant effects for eyelid for a long period of time, it can be used for keeping eyelids condition to exhibit good texture and no wrinkles and dullness. Also, the product is a solid powdery cosmetic with a good gloss, nonsticky, and a satisfactory makeup-retaining effect and sense of use without causing the generation of roughness and inflammation of skin. Furthermore, the product has a satisfactory thermal stability without causing deterioration of scent and deformation even when leaved under a high-temperature condition for a long period of time.

#### Example 18

##### Eye shadow

15	Additive for external dermatological agent, comprising functional powdery product supporting glycosyl-rutin and glycosyl-hesperidin, prepared by the method in Example 8	5 parts by weight
20	Talc	46 parts by weight
	Mica	16 parts by weight
	Sericite	5 parts by weight
	Pearl pigment	10 parts by weight
	Liquid paraffin	6 parts by weight
25	Methylpolysiloxane	5 parts by weight
	Sesquioreic acid sorbitan	3 parts by weight
	Black ferric oxide	3 parts by weight
	Silk powder supporting SHIKON dye	1 part by weight
	("UJO-SHIKON POWDER", commercialized by	



Hayashibara Biochemical Laboratories  
Inc., Okayama, Japan)

According to the above formula, an eye shadow was prepared by a conventional method. Since the product comprises functional powdery product supporting glucosyl-rutin and glycosyl-hesperidin, glycosyl-rutin and glycosyl-hesperidin on the functional powdery product or those gradually releasing from the functional powdery product absorb ultraviolet radiation, inhibit the generation of active oxygen and lipid peroxide of skin, and strengthen capillary vessel. Therefore, since the product inhibits the formation of wrinkles and sagging of eyelids and keeps aging-retardant effects for eyelid for a long period of time, it can be used for keeping eyelids condition to exhibit good texture and no wrinkles and dullness. Also, since the product comprises  $\alpha,\alpha$ -trehalose as an ingredient of additives for external dermatological agent, the product is a nonsticky solid powdery cosmetic which exhibits a satisfactory gloss, adhesion strength, makeup-retaining effect and sense of use. Further, the product shows no oily light, hardly runs by sweat and sebum and can be graded easily. In addition, since  $\alpha,\alpha$ -trehalose, glycosyl-rutin and glycosyl-hesperidin inhibit skin roughness and inflammation, the product has a satisfactory safety. Furthermore, the product has a satisfactory thermal stability without causing deterioration of scent and deformation even when leaved under a high-temperature condition for a long period of time.

25 Example 19

Oily suntan cosmetic

Liquid paraffin	68 parts by weight
Cetyloctanoate	28 parts by weight
Additive for external dermatological agent,	2 parts by weight

comprising functional powdery product  
supporting glycosyl-rutin, prepared by  
the method in Example 9

According to the above formula, an oily suntan cosmetic was  
5 prepared by a conventional method. Since the product comprises  
functional powdery product supporting glycosyl-rutin, glycosyl-rutin  
on the functional powdery product or that gradually releasing from the  
functional powdery product absorbs ultraviolet radiation and inhibits  
the generation of active oxygen and lipid peroxide, which are caused  
10 by sunburn, the product inhibits the formation of wrinkles of face and  
keeps its skin-aging-retardant effect for a long period of time.  
Therefore, the product can be used for keeping skin condition to exhibit  
good texture and no dullness. Also, since the powdery product supporting  
glycosyl-rutin absorbs ultraviolet radiation, the product can be used  
15 for preventing sunburn. Furthermore, since roughness and inflammation  
of skin are inhibited by anti-inflammatory effects of  
saccharide-derivatives of  $\alpha,\alpha$ -trehalose and glycosyl-rutin, which are  
comprised in additives for external dermatological agent, the product  
has a satisfactory safety.

20

#### Example 20

##### Soap

Neat soap obtained by conventional saponification-salting out method	96.5 parts by weight
25 from a mixture of beef tallow and palm oil (4 parts and 1 part by weight)	
Saccharide-derivatives of $\alpha,\alpha$ -trehalose in a syrupy form, used in Example 9	1.5 parts by weight
Ascorbic acid 2-glucoside	0.5 part by weight

(commercialized by Hayashibara  
Biochemical Laboratories Inc.,  
Okayama, Japan)

Sucrose 0.5 parts by weight

5 Functional powdery product supporting 0.5 part by weight  
for glycosyl-hesperidin, prepared by  
the method in Example 3

Functional powdery product supporting 0.5 parts by weight  
for L-ascorbic acid 2-glucoside,

10 prepared in Example 7

Maltitol 1 part by weight

Cellulose powder supporting

Safflower-red dyed cellulose powder

("BENIBANA-AKA CELLULOSE POWDER",

15 commercialized by Hayashibara  
Biochemical Laboratories Inc.,  
Okayama, Japan)

KANKO-SO No.201 0.0001 part by weight

Perfumeries suitable amount

20 According to the above formula, soap was prepared by a  
conventional method. Since the product comprises a functional powdery  
product supporting glycosyl-hesperidin, it can be used for inhibiting  
the generation of active oxygen and lipid peroxide in skin and  
strengthening capillary vessel by a synergy effect of  
25 glycosyl-hesperidin supported on the functional powdery product or that  
released from the functional powdery product and saccharide-derivatives  
of  $\alpha,\alpha$ -trehalose incorporated. Therefore, the product is a soap kind  
to the skin, which can be used for inhibiting skin roughness and  
inflammation of skin. Further, since the product comprises

saccharide-derivatives of  $\alpha,\alpha$ -trehalose, it has a satisfactory transparency even though it comprises saccharides.

Example 21

5 Cosmetic cream

(Formula 1)

	Polyoxyethyleneglycol monostearate	2 parts by weight
	Self-emulsifying glycerin monostearate	5 parts by weight
	Potassium DL-lactate	5 parts by weight
10	Behenylalcohol	1 part by weight
	Eicosatetraenoic acid	2 parts by weight
	Liquid paraffin	1 part by weight
	Functional powdery product supporting for glycosyl-rutin, prepared by the	2 parts by weight
15	method in Example 1	
	Glycerin trioctanoate	10 parts by weight
	Preservative	suitable amount
	(Formula 2)	
	Glycerin	2 parts by weight
20	1,3-Butyleneglycol	5 parts by weight
	Purified water	66 parts by weight
	Perfumeries	suitable amount

According to Formula 1, ingredients described above were mixed and dissolved by heating by a conventional method. After mixing  
25 ingredients in Formula 2 except for fragrance to the above mixture, the resulting mixture was emulsified using a homogenizer, admixed with fragrance and further mixed with stirring to make into a cosmetic cream. Since the product comprises a functional powdery product supporting glycosyl-rutin, glycosyl-rutin supported on the functional powdery

product or that released from the functional powdery product absorbs ultraviolet radiation and increases blood flow of skin. Also, since glycosyl-rutin inhibits the generation of active oxygen and lipid peroxide and the formation of blood vessel, one of cause of wrinkle formation, the product can be used for preventing the aging of skin. Further, since the product inhibits the oxidation and decomposition of lipids from sweat, grime, scurf, and sebum, it can be advantageously used for lowering body odor, preventing stimulation of the skin and the itch, and curing or preventing pigmentation such as pigmented spot, freckle, and sunburn. The product is a cosmetic cream with a satisfactory sense of use and nonsticky even when applied on the skin.

#### Example 22

##### Cosmetic cream

15	(Formula 1)	
	Polyoxyethyleneglycol monostearate	2 parts by weight
	Self-emulsifying glycerin monostearate	5 parts by weight
	Potassium DL-lactate	5 parts by weight
	Behenylalcohol	1 part by weight
20	Eicosatetraenoic acid	2 parts by weight
	Liquid paraffin	1 part by weight
	Glycerin trioctanoate	10 parts by weight
	Ascorbic acid 2-glucoside	2 parts by weight
	Preservative	suitable amount
25	(Formula 2)	
	Saccharide-derivative of $\alpha,\alpha$ -trehalose	1.6 parts by weight
	in a syrupy form, used in Example 9	
	Sodium hyaluronate	0.1 part by weight
	Dipotassium glycyrrhizinate	0.1 parts by weight

	Aloevera extract	0.1 part by weight
	Balm mint extract	0.05 part by weight
	<i>Chamomilla recutita</i> extract	0.05 part by weight
	Functional powdery product supporting	1 part by weight
5	for glycosyl-rutin, prepared by the method in Example 2	
	<i>Polygonum tinctorium</i> aqueous extract	1 part by weight
	(produced by Hayashibara Biochemical Laboratories Inc., Okayama, Japan)	
10	1,3-Butyleneglycol	5 parts by weight
	Purified water	66 parts by weight

According to Formula 1, ingredients described above were mixed and dissolved by heating by a conventional method. After mixing ingredients in Formula 2 to the above mixture, the resulting mixture

15 was emulsified using a homogenizer, admixed with suitable amount of fragrance and further mixed with stirring to make into a cosmetic cream. Since the product comprises a functional powdery product supporting glycosyl-rutin, glycosyl-rutin supported on the functional powdery product or that released from the functional powdery product absorbs

20 ultraviolet radiation and increases blood flow of skin. Also, since glycosyl-rutin inhibits the generation of active oxygen and lipid peroxide and the formation of blood vessel, one of cause of wrinkle formation, the product can be used for preventing the aging of skin. Further, since the product inhibits the oxidation and decomposition

25 of lipids from sweat, grime, scurf, and sebum, it can be advantageously used for lowering body odor, preventing stimulation of the skin and the itch, and curing or preventing pigmentation such as pigmented spot, freckle, and sunburn. The product is a cosmetic cream with a satisfactory sense of use and nonsticky even when applied on the skin.

Example 23

Cosmetic emulsion

	Stearic acid	2.5 parts by weight
5	Cetanol	1.5 parts by weight
	Vaseline	5 parts by weight
	Liquid paraffin	10 parts by weight
	Polyoxyethylene oreate	2 parts by weight
	Tocopherol acetate	0.5 part by weight
10	Dipotassium glycyrrhizinate	0.2 part by weight
	Polyethyleneglycol (1500)	3 parts by weight
	Ascorbic acid 2-glucoside	3 parts by weight
	Polygonum tinctorium aqueous extract	3 part by weight
	Additive for external dermatological agent,	5 parts by weight
15	comprising functional powdery product	
	supporting glycosyl-rutin, prepared by	
	the method in Example 9	4 parts by weight
	Triethanolamine	1 part by weight
	Purified water	66 parts by weight
20	Propylparaben	0.1 part by weight

According to Formulae, ingredients were mixed, adjusted to pH 6.7 by potassium hydroxide, and admixed with suitable amount of fragrance to make into a cosmetic emulsion. According to Formula 1, ingredients described above were mixed and dissolved by heating by a conventional method. After mixing ingredients in Formula 2 except for fragrance to the above mixture, the resulting mixture was emulsified using a homogenizer, admixed with fragrance and further mixed with stirring to make into a cosmetic emulsion. Since the product comprises a functional powdery product supporting glycosyl-rutin, glycosyl-rutin

supported on the functional powdery product or that released from the functional powdery product absorbs ultraviolet radiation and increases blood flow of skin. Also, since glycosyl-rutin inhibits the generation of active oxygen and lipid peroxide and the formation of blood vessel, one of cause of wrinkle formation, the product can be used for preventing the aging of skin. Further, since the product inhibits the oxidation and decomposition of lipids from sweat, grime, scurf, and sebum, it can be advantageously used for lowering body odor, preventing stimulation of the skin and the itch, and curing or preventing pigmentation such as pigmented spot, freckle, and sunburn. The product is a cosmetic emulsion with a satisfactory sense of use and nonsticky even when applied on the skin.

#### Example 24

##### 15 Conditioner (rinse)

(Formula 1)

	Liquid paraffin	2.5 parts by weight
	Myristic acid	0.5 part by weight
	Cetanol	1.5 parts by weight
20	Glycerin monostearate	3 parts by weight
	Polyoxyethylene octyldodecyletherdiester	1 part by weight
	lauroyl glutamate	
	Functional powdery product supporting glycosyl-rutin, prepared in Example 1	4 parts by weight
25	Polyoxyethyleneglyceril pyroglutamate isostearate	0.5 part by weight
	Photosensitizing dye No.301	0.1 part by weight
	(Formula 2)	
	Glycerin	3 parts by weight



	Lauroyl-L-lysine	2.5 parts by weight
	Fatty acid-L-arginineethylpyrrolidon carbonic acid salt	0.5 part by weight
	Stearyltrimethylammonium chloride	0.5 part by weight
5	Glycosyl-naringin	0.1 part by weight
	Sodium pyrrolidonecarboxylate	1 part by weight
	Purified water	75 parts by weight

According to the above formulae, a mixture prepared by mixing ingredients of Formula 1 by heating and another mixture prepared by mixing ingredients of Formula 2 by heating were mixed and emulsified by a conventional method to make into a conditioner. Since the product comprises a functional powdery product supporting glycosyl-rutin, glycosyl-rutin supported on the functional powdery product or that released from the functional powdery product absorbs ultraviolet radiation and increases blood flow of skin. Also, since glycosyl-rutin inhibits the generation of active oxygen and lipid peroxide and the formation of blood vessel, one of cause of wrinkle formation, the product can be used for preventing the aging of skin.

## 20 Example 25

### Shampoo

	2-Alkyl-N-carboxymethyl-N-hydroxymethyl- imidazolium betain (30% aqueous solution)	35 parts by weight
	Palm oil-fatty acid triethanolamine glutamate solution (30% aqueous solution)	35 parts by weight
25	Saccharide-derivatives of $\alpha,\alpha$ -trehalose in a syrupy form, used in Example 9	10 parts by weight
	Potassium cocoyl glycinate (30% aqueous solution)	10 parts by weight

Palm oil-fatty acid diethanolamide	2.3 parts by weight
Functional powdery product supporting for glycosyl-hesperidin, prepared in	3 parts by weight

Example 3

5    Photosensitizing dye No.201	0.1 part by weight
Photosensitizing dye No.301	0.1 part by weight
Purified water	10 parts by weight

According to the above formula, these ingredients were mixed and dissolved by heating to 70°C during stirring, and then admixed with

10 a suitable amount of fragrance by a conventional method to make into a shampoo. Since the product comprises a functional powdery product supporting glycosyl-hesperidin, glycosyl-rutin supported on the functional powdery product or that released from the functional powdery product increases blood flow of skin. Also, since glycosyl-rutin

15 inhibits the generation of active oxygen and lipid peroxide, the product can be used for preventing the aging of skin. Since the unpleasant smell derived from ingredients such as emulsifiers and the unpleasant taste, which is felt when a person put it in his mouth, are reduced, the product is a shampoo with a satisfactory foaming activity and sense of use.

20 In addition, since the product inhibits the formation of amines and aldehydes and/or the oxidation and decomposition of lipids, it can be advantageously used for preventing the formation of nasty odors originated from scalp and sebum, preventing itch, inhibiting the formation of scurf, and curing or preventing the aging of scalp. Further,

25 since the product comprises saccharide-derivatives of  $\alpha,\alpha$ -trehalose, it exhibits a satisfactory moisture-retaining activity and a low skin-irritating property compared with a shampoo prepared by using glycerin. Therefore, the product can be used without concerning hypersensitivity.

Example 26

Hair treatment

(Formula 1)

5	Stearylalcohol	5 parts by weight
	Glycerin monostearate	5 parts by weight
	Liquid paraffin	3.5 parts by weight
	Polyoxyethylene octyldodecyletherdiester lauroyl glutamate	2 part by weight

10	Polyoxyethyleneglyceril pyroglutamate isostearate	1 part by weight
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(Formula 2)

	Saccharide-derivatives of $\alpha,\alpha$ -trehalose in a syrupy form, used in Example 9	5 parts by weight
15	1,3-Butyleneglycol	3 parts by weight
	Stearyltrimethylammonium chloride	1 part by weight
	Sodium pyrrolidonecarbonate	1 part by weight
	Functional powdery product supporting glycosyl-rutin, prepared in Example 1	0.4 part by weight
20	Functional powdery product supporting L-ascorbic acid 2-glucoside, prepared in Example 7	0.4 part by weight
	Deionized water	65 parts by weight

According to the above formulae, ingredients in Formula 1 and

25 Formula 2 were respectively mixed during heating. Successively, both mixtures were mixed and emulsified by a conventional method to make into a hair treatment. Since the product comprises two functional powdery products respectively supporting glycosyl-rutin and ascorbic acid 2-glucoside, glycosyl-rutin and ascorbic acid 2-glucoside supported

on the functional powdery products or those released from the functional  
 powdery products increase blood flow of skin. Also, since glycosyl-rutin  
 and ascorbic acid 2-glucoside inhibit the generation of active oxygen  
 and lipid peroxide, the product can be used for preventing the aging  
 5 of skin. Further, since the product comprises saccharide-derivatives  
 of  $\alpha,\alpha$ -trehalose, the unpleasant smell derived from ingredients such  
 as emulsifiers and the unpleasant taste, which is felt when a person  
 put it in his mouth, are reduced. Therefore, the product is a hair  
 treatment exhibiting a satisfactory moisture-retaining activity, a low  
 10 skin-irritating property, and a satisfactory sense of use.

Example 27

Ointment for curing wound

(Formula 1)

15	Macrogol (400)	50 parts by weight
	Carboxyvinyl polymer	3 parts by weight
	Pullulan	1 part by weight
	Isopropanol	400 parts by weight
	Chlorhexidine gluconate solution	1 part by weight
20	Functional powdery product supporting for glycosyl-rutin, prepared by the method in Example 2	2 parts by weight

(Formula 2)

	Saccharide-derivatives of $\alpha,\alpha$ -trehalose	80 parts by weight
25	in a syrupy form, used in Example 9	
	Sodium hydroxide	3 parts by weight
	Purified water	67 parts by weight

According to the above formulae, ingredients in Formula 1 were

mixed during stirring *in vacuo* by a conventional method. Successively, ingredients in Formula 2 were mixed to the above mixture to make into an ointment for curing wound which exhibits adequate extendability and adhesiveness. Since the product comprises functional powdery product supporting glycosyl-rutin, glycosyl-rutin supported on the functional powdery product or that released from the functional powdery product inhibits the generation of active oxygen and lipid peroxide, and prevents inflammation of the skin. Since the product comprises saccharide-derivatives of  $\alpha, \alpha$ -trehalose, the unpleasant smell derived from ingredients and the unpleasant taste, which is felt when a person put it in his mouth, are reduced. The product exhibits a satisfactory sense of use and can be used for curing wounds such as incised wound, scratch, burn injury, athlete's foot and chilblain by applying it to wound directly or with using gauzes.

#### INDUSTRIAL APPLICABILITY

The functional powdery product of the present invention, which is prepared by allowing a carrier such as saccharides to support one or more members selected from vitamin glycosides, can be incorporated easily in a powdery form to external dermatological agent in the forms of powder, solid or solid powder and enables to extend the uses of vitamin glycosides. In the case of incorporating the functional powdery product of the present invention into an external dermatological agent, vitamin glycosides supported on a carrier such as saccharides or those gradually released from the carrier contact to the skin. Since the vitamin glycosides exhibit activities of vitamins such as ultraviolet radiation-absorbing activity, antioxidative activity and antiinflammation activity and keep those activities for a long period

of time, the external dermatological agent can be used for improving skin metabolism and inhibiting the formation of skin roughness and the aging of the skin, which are caused by inflammation of the skin and allergies. Also, since the vitamin glycosides inhibit inflammation of the skin, allergic reaction and the aging of the skin, the external dermatological agent can be used for inhibiting the formation of wrinkles, saggings, pigmented spots and skin dullness and keeping natural skin with a satisfactory texture. The present invention, having these outstanding functions and effects, is a significantly important invention that greatly contributes to this art.